North Clin Istanb 2026;13(5):558–567
doi: 10.14744/nci.2026.20280

Original Article PUBLIC HEALTH

Awareness, knowledge, perceptions, and use of electronic cigarettes and heated tobacco products among adults attending a university hospital: A cross-sectional study

Tugce Arslan Torba,[1] Muhammed Fatih Onsuz,[1] Feyza Akbay,[1] Onur Er,[1] Burak Sahin,[2] Fatma Betul Agit,[2] Taha Oftadeh Beiragh,[2] Fatma Sevici[2]

[1]Department of Public Health, Eskisehir Osmangazi University Faculty of Medicine, Eskisehir, Turkiye

[2]Faculty of Medicine, Eskisehir Osmangazi University Faculty of Medicine, Eskisehir, Turkiye

ABSTRACT

OBJECTIVE: The aim of this study was to evaluate awareness, knowledge, perceptions, and use of electronic cigarettes and heated tobacco products (HTPs) among adults attending a university hospital and to identify independent factors associated with ever use of these products.

METHODS: This cross-sectional study included 384 adults aged ≥18 years attending the outpatient clinics of a university hospital in Turkiye. Data were collected using a structured questionnaire assessing sociodemographic characteristics, smoking status, awareness, knowledge, perceptions, and use of electronic cigarettes and HTPs. Descriptive statistics, Chi-square and Mann–Whitney U-tests, and multivariable logistic regression analyses were performed to identify factors independently associated with ever use of electronic cigarettes and HTPs.

RESULTS: Awareness of electronic cigarettes was substantially higher than that of HTPs (90.4% vs. 37.5%), while ever use was reported by 38.0% and 10.4% of participants, respectively. More than half of the participants lacked knowledge regarding the harmfulness, addictiveness, legal status, and smoking cessation role of HTPs. Current smokers were significantly more likely than non-smokers to perceive electronic cigarettes and HTPs as less harmful, less addictive, and useful for smoking cessation (all $p<0.05$). In multivariable logistic regression analyses, increasing age was associated with lower odds of ever use of electronic cigarettes (adjusted odds ratio [AOR]: 0.91,95% confidence interval [CI]: 0.89–0.94) and HTPs (AOR: 0.93, 95% CI: 0.89–0.97). Male sex (electronic cigarettes: AOR: 3.85, 95% CI: 2.18–6.82; HTPs: AOR: 2.65, 95% CI: 1.25–5.62) and current cigarette smoking (electronic cigarettes: AOR: 10.41, 95% CI: 5.57–19.46; HTPs: AOR: 3.88, 95% CI: 1.77–8.49) were independently associated with ever use of both products.

CONCLUSION: Although awareness of electronic cigarettes was high, awareness of HTPs was considerably lower, and substantial knowledge gaps and misconceptions regarding HTPs persisted. Current smokers were more likely to hold favorable perceptions of both products, and younger age, male sex, and current cigarette smoking were independently associated with ever use. These findings underscore the need for evidence-based public health interventions to improve public knowledge, correct misconceptions regarding the harmfulness and smoking cessation role of these products, and support tobacco control strategies aimed at preventing the uptake of emerging tobacco products.

Keywords: Attitudes; electronic cigarettes; health knowledge; heated tobacco products; practice; public health; tobacco use.

Cite this article as: *Arslan Torba T, Onsuz MF, Akbay F, Er O, Sahin B, Agit FB, et al. Awareness, knowledge, perceptions, and use of electronic cigarettes and heated tobacco products among adults attending a university hospital: A cross-sectional study. North Clin Istanb 2026;13(5):558–567.*

Received: August 10, 2026 *Revised:* August 21, 2026 *Accepted:* September 09, 2026 *Online:* October 19, 2026

Correspondence: Tugce ARSLAN TORBA, MD. Tepebasi Ilce Saglik Mudurlugu, Eskisehir, Turkiye.
Tel: +90 506 919 75 62 e-mail: dr.tugce.arslan@gmail.com

Istanbul Provincial Directorate of Health - Available online at www.northclinist.com

In recent years, the use of new-generation tobacco and nicotine products, such as electronic cigarettes and heated tobacco products (HTPs), has increased worldwide, making these products increasingly visible [1, 2]. Electronic cigarettes and HTPs are often promoted and marketed as less harmful alternatives to conventional cigarettes. However, accumulating evidence indicates that these products are not harmless. Electronic cigarette use has been associated with adverse respiratory and cardiovascular effects, including airway inflammation and vascular and endothelial dysfunction. Similarly, HTP use has been associated with inflammatory responses, impaired respiratory function, and adverse cardiovascular effects. Both products can also sustain nicotine dependence. Although uncertainties remain regarding their long-term health effects, current evidence raises important concerns about their potential health risks [1, 3–6].

Electronic cigarettes deliver nicotine through aerosolized liquids and are widely perceived as less harmful alternatives to conventional cigarettes [7]. The main reasons for using electronic cigarettes include the belief that they are less harmful than conventional cigarettes, the desire to quit or reduce smoking, the availability of a variety of flavors, the influence of social circles, and curiosity [8].

HTPs are devices that heat tobacco to approximately 350°C to produce a nicotine-containing aerosol without combustion and are therefore referred to as "heat-not-burn" products [9]. The reasons for HTP use include the desire to quit or reduce smoking, the belief that these products are less harmful than conventional cigarettes, and the preference for their taste and flavor [10]. However, uncertainties remain regarding the long-term health effects of these products, while evidence supporting their effectiveness for smoking cessation remains limited, and discrepancies may exist between public perceptions and the available evidence [1].

Misperceptions regarding the safety of novel tobacco and nicotine products may contribute to experimentation and continued use, particularly among young adults. Therefore, understanding public awareness, knowledge, and perceptions is essential for informing tobacco control policies and public health interventions [1, 4]. In particular, HTPs have been investigated to a more limited extent than electronic cigarettes in terms of public awareness, knowledge, perceptions, and use, as they are relatively newer products.

Although several studies have examined electronic cigarette use in Turkiye, studies simultaneously evaluating awareness, knowledge, perceptions, and use of both electronic cigarettes and HTPs remain limited. This study aimed to evaluate awareness, knowledge, perceptions, and use of these products among adults attending the outpatient clinics of a university hospital and to identify factors associated with ever use.

Highlight key points

- Awareness of electronic cigarettes was substantially higher than awareness of HTPs among adults attending a university hospital.
- Considerable uncertainty and misconceptions regarding the harmfulness, addictiveness, legal status, and smoking cessation role of HTPs were identified.
- Current cigarette smokers had more favorable perceptions of electronic cigarettes and HTPs and reported higher lifetime use than non-smokers.
- Younger age, male sex, and current cigarette smoking were independently associated with ever use of both electronic cigarettes and HTPs.
- Evidence-based public health communication is needed to correct misconceptions and improve knowledge regarding novel tobacco products.

MATERIALS AND METHODS

Study Design and Setting

This cross-sectional study was conducted between April 2025 and June 2025 among adults aged ≥18 years attending the outpatient clinics of a university hospital in Eskisehir, Turkiye. The required sample size was calculated using Epi Info software. Assuming an expected awareness prevalence of 50% regarding electronic cigarettes and HTPs, a 95% confidence level, and a 5% margin of error, the minimum required sample size was determined to be 384 participants.

Individuals waiting in the outpatient clinic waiting areas were informed about the purpose and subject of the study. Those who agreed to participate provided both written and verbal informed consent. Participants completed a structured questionnaire under the supervision of medical students involved in the data collection process. Completion of the questionnaire took approximately 10–15 min.

Ethical Considerations

Ethical approval for the study was obtained from the Non-Interventional Clinical Research Ethics Commit-

tee of Eskisehir Osmangazi University (Approval No. E-25403353-050.04-250201638, dated March 27, 2025). Written permission to collect the study data was also obtained from the Chief Physician's Office of the university hospital where the study was conducted. The study was conducted in accordance with the ethical principles of the Declaration of Helsinki. Written ad verbal informed consent was obtained from all participants before their participation in the study.

Data Collection

A questionnaire was developed based on the literature and used as the data collection instrument in this study [11–15]. The questionnaire consisted of five sections.

The first section included questions assessing the participants' sociodemographic characteristics, including age, sex, marital status, educational level, employment status, household composition, and household income.

The second section included questions on factors that might be associated with electronic cigarette and HTP use, including a history of chronic or psychiatric disease, alcohol consumption, and conventional cigarette smoking status.

The third section assessed participants' awareness, sources of information, and use of electronic cigarettes and HTPs. Participants were asked whether they had previously heard of these products, their sources of information, whether they had ever tried them, and their current use status.

The fourth section consisted of statements regarding electronic cigarettes and HTPs. Participants were asked to evaluate issues related to the perceived harmfulness of these products, their addictiveness, their role in smoking cessation, the risks associated with passive exposure, and their legal status.

The fifth section assessed participants' opinions regarding the reasons for using electronic cigarettes and HTPs. Participants were asked about potential motivations for use, including smoking cessation, the belief that these products are less harmful, social influences, curiosity, flavor characteristics, and the perception that they can be used in indoor environments.

Definitions

Participants who smoked at least one cigarette per day were classified as current smokers [3].

Awareness of electronic cigarettes and HTPs was assessed separately using a single question for each product asking whether the participant had previously heard of the respective product. Participants who responded "yes" were classified as being aware of that product.

Ever use of electronic cigarettes or HTPs was defined as having used the respective product at least once during the participant's lifetime.

Statistical Analysis

The data were analyzed using IBM Statistical Package for the Social Sciences Statistics version 31.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were presented as frequencies, percentages, means, standard deviations, medians, and interquartile ranges, as appropriate. The normality of continuous variables was assessed using the Kolmogorov–Smirnov test. The Mann–Whitney U-test was used to compare continuous variables, and the Pearson Chi-square test was used to analyze categorical variables. When appropriate, Bonferroni-corrected post hoc Z-tests were performed.

Separate multivariable logistic regression models were constructed to identify factors associated with ever use of electronic cigarettes and HTPs. Variables considered clinically and epidemiologically relevant based on the study findings and previous literature were included as independent variables in the models. The results of the logistic regression analyses were reported as adjusted odds ratios (AORs) with 95% confidence intervals (CIs). $p \leq 0.05$ was considered statistically significant.

RESULTS

Sociodemographic and Health Characteristics

A total of 384 individuals participated in the study, of whom 59.6% were women. The mean age of the participants was 36.78±15.78 years (range: 18–79 years). Overall, 40.9% of the participants were current smokers. A history of chronic disease was reported by 34.9% of the participants, while 12.5% reported a history of psychiatric disease. In addition, 69.3% of the participants reported living with their families. The sociodemographic and health characteristics of the study population are presented in Table 1.

Awareness, Sources of Information, and Use of Electronic Cigarettes and HTPs

Awareness of electronic cigarettes was higher than that of HTPs. Overall, 90.4% of the participants reported having previously heard of electronic cigarettes, whereas

Table 1. Sociodemographic and health characteristics of the study participants (n=384)

Variable	Category	Percentage
Sex	Female	59.6
	Male	40.4
Marital status	Married	50.3
	Single	44.0
	Other (divorced/widowed)	5.7
Educational level	University or Higher	54.2
	High school	31.0
	Other (primary/middle school)	14.8
Employment status	Unemployed	55.7
	Employed	44.3
Living arrangement	With family	69.3
	With friends/peers	15.1
	Alone	15.6
Income level	Low	8.6
	Middle	85.4
	High	6.0
History of chronic disease	No	65.1
	Yes	34.9
History of psychiatric disease	No	87.5
	Yes	12.5
Smoking status	Current smoker (≥1 cigarette/day)	40.9
	Former smoker	2.6
	Never smoker	56.5

37.5% had heard of HTPs. The proportion of participants who reported ever using electronic cigarettes was 38.0%, compared with 10.4% for HTPs. Current use was 5.2% for electronic cigarettes and 1.3% for HTPs. Friends and social circles were the primary source of information about electronic cigarettes (60.2%), whereas the internet and social media were the primary source for HTPs (18.2%). Data on awareness, sources of information, and use of electronic cigarettes and HTPs are presented in Table 2.

Awareness and Use According to Smoking Status

Current smokers demonstrated significantly higher awareness and use of electronic cigarettes than non-smokers. Awareness of electronic cigarettes was higher among current smokers than non-smokers (96.2% vs. 86.3%, p=0.001), whereas awareness of HTPs did not differ significantly between the two groups (42.7% vs. 33.9%, p=0.081).

Similarly, ever use of both products was significantly more common among current smokers than non-smokers. Ever use of electronic cigarettes was reported by 61.8% of current smokers compared with 21.6% of non-smokers, while ever use of HTPs was reported by 17.8% and 5.3% of the two groups, respectively (both p<0.001). Detailed findings are presented in Table 3.

Knowledge and Perceptions Regarding Electronic Cigarettes and HTPs

Participants showed substantially greater uncertainty regarding HTPs than electronic cigarettes across all knowledge and perception statements. For HTPs, "don't know" responses predominated for all statements, particularly those regarding legal status, addictiveness, harmfulness, smoking cessation, and passive exposure.

When responses were compared according to smoking status, current smokers demonstrated significantly more favorable perceptions of both electronic cigarettes and HTPs than non-smokers. They were more likely to perceive these products as less addictive, less harmful, associated with lower risks from passive exposure, and useful for smoking cessation (all p<0.05), whereas perceptions regarding their legal status did not differ significantly between the groups. Detailed findings are presented in Table 4.

Perceived Reasons for Using Electronic Cigarettes and HTPs

Participants more frequently associated electronic cigarettes than HTPs with several potential reasons for use. The most commonly reported reasons were taste, flavor, and smell, followed by smoking cessation and the belief that these products are less harmful than conventional cigarettes. In contrast, substantially fewer participants associated HTPs with these reasons. Detailed findings are presented in Table 5.

Factors Associated with Ever Use of Electronic Cigarettes and HTPs

Multivariable logistic regression analyses showed that younger age, male sex, and current cigarette smoking were independently associated with ever use of both electronic cigarettes and HTPs. Each 1-year increase in age was associated with lower odds of ever using electronic cigarettes (AOR=0.91, 95% CI: 0.89–0.94, p<0.001) and HTPs

Table 2. Awareness, sources of information, and use of electronic cigarettes and HTPs (n=384)

Variables	HTPs (%)	Electronic cigarettes (%)
Never heard of	62.5	9.6
Primary source of information	Social media 18.2	Friends and social circles 60.2
Never used	89.6	62.0
Ever used	10.4	38.0
Current users	1.3	5.2

HTPs: Heated tobacco products.

Table 3. Comparison of awareness and use of electronic cigarettes and HTPs according to smoking status (n=384)

Electronic cigarette and HTP status	Current smokers (n=157) (%)	Non-smokers* (n=227) (%)	Total (%)	χ^2/p
Awareness of HTPs				
No	57.3	66.1	62.5	χ^2=3.035
Yes	42.7	33.9	37.5	p=0.081
Awareness of electronic cigarettes				
No	3.8	13.7	9.6	χ^2=10.310
Yes	96.2	86.3	90.4	p=0.001
Ever use of electronic cigarettes				
No	38.2	78.4	62.0	χ^2=63.639
Yes	61.8	21.6	38.0	p<0.001
Ever use of HTPs				
No	82.2	94.7	89.6	χ^2=15.660
Yes	17.8	5.3	10.4	p<0.001

*: Non-smokers included both former smokers and never smokers; HTPs: Heated tobacco products.

(AOR=0.93, 95% CI: 0.89–0.97, p<0.001). Compared with women, men had higher odds of ever using electronic cigarettes (AOR=3.85, 95% CI: 2.18–6.82, p<0.001) and HTPs (AOR=2.65, 95% CI: 1.25–5.62, p=0.011). Current cigarette smokers also had higher odds of ever using electronic cigarettes (AOR=10.41, 95% CI: 5.57–19.46, p<0.001) and HTPs (AOR=3.88, 95% CI: 1.77–8.49, p<0.001) than non-smokers. History of psychiatric disease and living arrangement were not independently associated with ever use of either product (Table 6).

DISCUSSION

In this study, awareness of electronic cigarettes was found to be considerably higher than awareness of HTPs. However, substantial knowledge gaps and uncertainty were identified regarding the addictiveness, harmfulness, role in smoking cessation, and legal status of HTPs. The findings also showed that perceptions that electronic cigarettes and HTPs are less harmful than conventional cigarettes and can be used for smoking cessation remain prevalent among the study population. Furthermore, current smokers had more favorable perceptions of these novel products than non-smokers, while younger age, male sex, and current cigarette smoking were independently associated with ever use of both electronic cigarettes and HTPs.

Our findings showed that electronic cigarettes were substantially more widely recognized than HTPs. While electronic cigarettes have become well-known products among the general population, awareness of HTPs remained limited, with considerable uncertainty regarding their health

TABLE 4. Knowledge and perceptions regarding electronic cigarettes and HTPs according to smoking status

Statements	Current smokers (n=157) (%)	Non-smokers* (n=227) (%)	Total (n=384) (%)	χ^2/p
"The import and sale of electronic cigarettes are prohibited in Türkiye."				
Agree	35.7	37.0	36.5	
Disagree	28.0	23.8	25.5	χ^2=0.904
Don't know	36.3	39.2	38.0	p=0.636
"The import and sale of HTPs are prohibited in Türkiye."				
Agree	21.7	24.7	23.4	
Disagree	15.3	14.1	14.6	χ^2=0.500
Don't know	63.1	61.3	62.0	p=0.779
"Electronic cigarettes may be less addictive."				
Agree	29.3[b]	15.4[b]	21.1	
Disagree	49.7[a]	52.9[a]	51.6	χ^2=12.545
Don't know	21.0[a]	31.7[a]	27.3	p=0.002
"HTPs may be less addictive."				
Agree	14.0[b]	6.2[b]	9.4	
Disagree	33.1[a]	37.4[a]	35.7	χ^2=6.789
Don't know	52.9[a]	56.4[a]	54.9	p=0.034
"Electronic cigarettes may be less harmful."				
Agree	25.5[b]	12.3[b]	17.7	
Disagree	49.0[a]	58.1[a]	54.4	χ^2=11.010
Don't know	25.5[a]	29.5[a]	27.9	p=0.004
"HTPs may be less harmful."				
Agree	18.5[b]	6.6[b]	11.5	
Disagree	31.2[a]	39.6[a]	36.2	χ^2=13.433
Don't know	50.3[a]	53.7[a]	52.3	p=0.001
"The aerosol from electronic cigarettes is less harmful."				
Agree	30.6[b]	13.2[b]	20.3	
Disagree	40.8[a]	52.4[a]	47.7	χ^2=17.354
Don't know	28.7[a]	34.4[a]	32.0	p<0.001
"The aerosol from HTPs is less harmful."				
Agree	16.6[b]	6.2[b]	10.4	
Disagree	30.6[a]	41.0[a]	36.7	χ^2=12.356
Don't know	52.9[a]	52.9[a]	52.9	p=0.002
"Smoking cessation can be achieved using electronic cigarettes."				
Agree	29.3[b]	14.1[b]	20.3	
Disagree	52.9[a]	58.1[a]	56.0	χ^2=14.876
Don't know	17.8[a]	27.8[a]	23.7	p<0.001
"Smoking cessation can be achieved using HTPs."				
Agree	15.9[b]	7.5[b]	10.9	
Disagree	32.5[a]	41.4[a]	37.8	χ^2=7.999
Don't know	51.6[a,b]	51.1[a,b]	51.3	p=0.018

Within each statement, columns with different superscript letters (a, b) differ significantly according to Bonferroni-adjusted post hoc comparisons of column proportions (Post hoc Z-test) (p<0.05). Columns sharing the same superscript letter do not differ significantly. HTPs: Heated tobacco products; *: Non-smokers included both former smokers and never smokers.

Table 5. Perceived reasons for using electronic cigarettes and HTPs

Reasons for use	Electronic cigarettes n (%)	HTPs n (%)	Both n (%)	Don't know n (%)
Taste/flavor/smell	254 (66.1)	39 (10.2)	40 (10.4)	51 (13.3)
Smoking cessation	253 (65.9)	36 (9.4)	53 (13.8)	42 (10.9)
Belief that they are less harmful than conventional cigarettes	249 (64.8)	48 (12.5)	35 (9.1)	52 (13.5)
Belief that they are less harmful to bystanders	238 (62.0)	46 (12.0)	31 (8.1)	69 (18.0)
Curiosity/social influence/perceived attractiveness	233 (60.7)	41 (10.7)	69 (18.0)	41 (10.7)
Belief that they can be used where cigarette smoking is prohibited	230 (59.9)	37 (9.6)	44 (11.5)	73 (19.0)
Lower cost	188 (49.0)	80 (20.8)	13 (3.4)	103 (26.8)

HTPs: Heated tobacco products.

Table 6. Multivariable logistic regression analysis of factors associated with ever use of electronic cigarettes and HTPs

Variable	Ever use of electronic cigarettesAOR (95% CI)	p	Ever use of HTPs AOR (95% CI)	p
Age (years)	0.91 (0.89–0.94)	<0.001	0.93 (0.89–0.97)	<0.001
Sex				
Female (ref)	1.00	–	1.00	–
Male	3.85 (2.18–6.82)	<0.001	2.65 (1.25–5.62)	0.011
Current cigarette smoking				
No (ref)	1.00	–	1.00	–
Yes	10.41 (5.57–19.46)	<0.001	3.88 (1.77–8.49)	<0.001
History of psychiatric disease				
No (ref)	1.00	–	1.00	–
Yes	1.99 (0.89–4.46)	0.095	2.11 (0.84–5.33)	0.113
Living arrangement				
Family (ref)	1.00	–	1.00	–
Friends/peers	1.51 (0.69–3.28)	0.303	1.37 (0.51–3.65)	0.533
Living alone	1.79 (0.82–3.88)	0.144	1.97 (0.79–4.91)	0.144

HTPs: Heated tobacco products; AOR: Adjusted odds ratio; CI: Confidence interval.

effects, addictive potential, role in smoking cessation, and legal status. A large-scale study conducted across 11 European countries reported that only 27.8% of the population was aware of HTPs [2]. Consistent with these findings, a national study conducted in Pakistan also reported limited awareness and knowledge regarding HTPs [12]. In contrast, in South Korea, where HTPs have been available on the market for a longer period, the use of these products has been reported to be more widespread [16]. These differences may be related to variations in regulatory policies, marketing practices, and product availability across countries. Nevertheless, the inability of a substantial proportion of participants to express an opinion regarding the basic characteristics of HTPs suggests that improving public knowledge about these products should be an important component of tobacco control strategies.

In the present study, novel tobacco products were perceived as being less harmful and less addictive than conventional cigarettes and as potentially helpful for smoking cessation. These perceptions may be related to the tobacco

industry's marketing of electronic cigarettes and HTPs as "alternative" or "harm reduction" products [3]. However, current evidence indicates that HTPs are not harmless products. Their aerosols may contain toxic and carcinogenic substances, they can sustain nicotine dependence, and uncertainties regarding their long-term health effects remain [3, 9, 17]. In addition, evidence supporting the role of HTPs in smoking cessation is limited. A recent systematic review reported that the certainty of the evidence supporting the effectiveness of HTPs in promoting smoking cessation or reducing smoking prevalence was low [4]. The U.S. Centers for Disease Control and Prevention also states that HTPs are not an food and drug administration-approved method for smoking cessation [18]. Furthermore, a recent systematic review and meta-analysis found that more than two-thirds of HTP users continued to smoke conventional cigarettes concurrently, suggesting that HTPs are not supported as an effective smoking cessation aid under real-world conditions [19]. Consistent with these findings, participants in our study most frequently associated novel tobacco products with being less harmful than conventional cigarettes and with helping people quit smoking. Similarly, studies conducted in Europe and Germany have reported that perceived harm reduction and the desire to quit or reduce cigarette smoking are among the primary reasons for HTP use [10, 20]. Therefore, correcting these misconceptions through evidence-based public health communication should be considered a priority for tobacco control.

Current cigarette smokers expressed more favorable views toward electronic cigarettes and HTPs than non-smokers. Compared with non-smokers, current smokers were more likely to agree that both products are less harmful and less addictive than conventional cigarettes and may help with smoking cessation. Consistent with our findings, studies from different countries have reported that electronic cigarettes and HTPs are often perceived as less harmful alternatives to conventional cigarettes and that expectations of harm reduction constitute an important motivation for their use [2, 12, 21, 22]. This may reflect smokers' desire to reduce health risks or quit smoking, leading them to view these products more favorably. Alternatively, it may be associated with tobacco industry marketing strategies specifically targeting current cigarette smokers. Nevertheless, these differences in risk perception suggest that knowledge and perceptions regarding novel tobacco products differ between smokers and non-smokers, with smokers tending to hold more favorable views of these products.

In the multivariable analysis, younger age, male sex, and current cigarette smoking were independently associated with ever use of both electronic cigarettes and HTPs. These findings are consistent with the current literature on the determinants of novel tobacco product use. In a meta-analysis, Scala et al. [19] demonstrated that male sex, younger age, and current cigarette smoking were significantly associated with HTP use, with current smokers having approximately 15-fold higher odds of using HTPs than never smokers. Similarly, in a study conducted across 28 European countries, Laverty et al. [10] reported that HTP use was more common among younger individuals and current cigarette smokers. In a recent study from Germany, Keller et al. [20] found that HTP users were predominantly young men and that a substantial proportion of users continued to smoke conventional cigarettes. Likewise, Miller et al. [23] showed that HTP users in four high-income countries were generally younger individuals, the majority of whom also used cigarettes and/or electronic cigarettes. Younger adults may be more likely to try electronic cigarettes and HTPs due to greater interest in newer tobacco and nicotine products. The higher use observed among men may be related to differences in tobacco-use patterns between men and women. For current smokers, trying these products may be linked to seeking alternatives to conventional cigarettes, particularly when they are perceived as less harmful or as potentially helpful for quitting smoking. This interpretation is also consistent with the more favorable perceptions of these products observed among current smokers in our study.

These findings have practical implications for tobacco control interventions. Healthcare professionals could provide brief, evidence-based counseling, particularly to young adults and current smokers, addressing misconceptions that electronic cigarettes and HTPs are safer alternatives to conventional cigarettes or effective smoking-cessation aids. Individuals who wish to quit smoking could also be referred to smoking-cessation clinics for appropriate cessation support.

Strengths and Limitations

This study has several strengths and limitations. Its main strengths include the comprehensive assessment of awareness, knowledge, perceptions, and ever use of electronic cigarettes and HTPs, as well as being one of the few studies conducted in Turkiye to examine HTPs alongside electronic cigarettes. However, several limita-

tions should be acknowledged. First, the cross-sectional design precludes any inference of causal relationships between the variables. Second, because participants were recruited among individuals attending the outpatient clinics of a single university hospital, the possibility of selection bias cannot be excluded, and the findings may not be generalizable to the broader population. Third, because all information was self-reported, the possibility of information bias, including recall and social desirability bias, cannot be excluded.

Conclusion

This study identified substantial knowledge gaps and uncertainty regarding HTPs despite the high level of awareness of electronic cigarettes. In addition, electronic cigarettes and HTPs were frequently perceived as safer alternatives to conventional cigarettes and as potential smoking cessation aids. These findings highlight a discrepancy between the current scientific evidence and public perceptions of these products.

The findings underscore the need for population-based educational and awareness initiatives addressing novel tobacco products. In particular, disseminating up-to-date, evidence-based information on the health effects, addictive potential, and effectiveness of electronic cigarettes and HTPs for smoking cessation, especially among young people and current cigarette smokers, is essential. Furthermore, population-based longitudinal studies investigating the prevalence, perceptions, and motivations for the use of novel tobacco products are needed to inform and strengthen tobacco control policies. Preventing the marketing of novel tobacco and nicotine products as safe alternatives and correcting public misconceptions through evidence-based risk communication should be prioritized within tobacco control policies.

Ethics Committee Approval: This study was approved by The Non-Interventional Clinical Research Ethics Committee of Eskisehir Osmangazi University (Approval No. E-25403353-050.04-250201638; 27.03.2025).

Informed Consent: Written informed consents were obtained from patients who participated in this study.

Conflict of Interest: The authors declare that there is no conflict of interest.

Financial Disclosure: The authors declared that this study received no financial support.

Use of AI for Writing Assistance: During the preparation of this manuscript, the authors used ChatGPT (OpenAI) solely to assist with translation and language editing.

Authorship Contributions: Concept – MFO; Design – TAT, MFO, FA, OE; Supervision – MFO; Data Collection and/or Processing – FA, DE, BS, FBA, TOB, FS; Analysis and/or Interpretation – TAT, MFO; Literature Search – TAT, FA; Writing – TAT, OE; Critical Reviews – TAT, MFO, FA, OE, BS, FBA, TOB, FS.

Peer-review: Externally peer-reviewed.

REFERENCES

1. World Health Organization. WHO report on the global tobacco epidemic, 2025: warning about the dangers of tobacco. Geneva: World Health Organization; 2025. Available at: https://www.who.int/publications/i/item/9789240112063. Accessed September 18, 2026.
2. Gallus S, Lugo A, Liu X, Borroni E, Clancy L, Gorini G, et al. Use and awareness of heated tobacco products in Europe. J Epidemiol 2022;32:139-44. [CrossRef]
3. World Health Organization. WHO report on the global tobacco epidemic 2021: addressing new and emerging products. Geneva: World Health Organization; 2021. Available at: https://www.who.int/publications/i/item/9789240032095. Accessed September 18, 2026.
4. Tattan-Birch H, Hartmann-Boyce J, Kock L, Simonavicius E, Brose L, Jackson S, et al. Heated tobacco products for smoking cessation and reducing smoking prevalence. Cochrane Database Syst Rev 2022;1. [CrossRef]
5. Hamann SL, Kungskulniti N, Charoenca N, Kasemsup V, Ruangkanchanasetr S, Jongkhajornpong P. Electronic cigarette harms: aggregate evidence shows damage to biological systems. Int J Environ Res Public Health 2023;20:6808. [CrossRef]
6. Znyk M, Kaleta D. The health effects of heated tobacco product use-a narrative review. Healthcare (Basel) 2025;13:2042. [CrossRef]
7. UCSF. Grana R, Benowitz N, Glantz S. Background paper on e-cigarettes (electronic nicotine delivery systems). WHO Tobacco Control Papers: University of California, San Francisco; 2013. Available at: https://escholarship.org/uc/item/13p2b72n. Accessed September 18, 2026.
8. Sapru S, Vardhan M, Li Q, Guo Y, Li X, Saxena D. E-cigarettes use in the United States: reasons for use, perceptions, and effects on health. BMC Public Health 2020;20:1518. [CrossRef]
9. Auer R, Concha-Lozano N, Jacot-Sadowski I, Cornuz J, Berthet A. Heat-not-burn tobacco cigarettes: smoke by any other name. JAMA Intern Med 2017;177:1050-2. [CrossRef]
10. Laverty AA, Vardavas CI, Filippidis FT. Prevalence and reasons for use of Heated Tobacco Products (HTP) in Europe: an analysis of Eurobarometer data in 28 countries. Lancet Reg Health Eur 2021;8:100159. [CrossRef]
11. Alhajj MN, Al-Maweri SA, Folayan MO, Halboub E, Khader Y, Omar R, et al. Knowledge, beliefs, attitude, and practices of E-cigarette use among dental students: A multinational survey. PLoS One 2022;17. [CrossRef]
12. Irshad HA, Jehanzeb H, Raja S, Saleem U, Shaikh WA, Shahzad A, et al. Heated tobacco products- well known or well understood? A national cross-sectional study on knowledge, attitudes and usage in Pakistan. BMC Public Health 2024;24:1328. [CrossRef]
13. Bostan P, Görek Dilektaşlı A. The knowledge and attitude about new generation tobacco products among physicians. Turk Thorac J 2022;23:369-75. [CrossRef]
14. Al Oweidat K, Toubasi A, AlSamhori JF, Aljayeh M, Shetaiwi D, Halasa Z, et al. Knowledge, attitude, and practice toward IQOS among Jordanian population: a cross-sectional study. JAPA Acad J 2025;3:45-51. [CrossRef]

15. Shin DW, Kim YI, Kim SJ, Kim JS, Chong S, Park YS, et al. Lung cancer specialist physicians' attitudes towards e-cigarettes: A nationwide survey. PLoS One 2017;12. [CrossRef]
16. Lee B, Kwon M, Park AH, Kim H. Tobacco use trends in South Korea, 2013-2023: Persistent disparities and emerging challenges in a repeated cross-sectional study. Tob Induc Dis 2026;24. [CrossRef]
17. Mallock N, Pieper E, Hutzler C, Henkler-Stephani F, Luch A. Heated tobacco products: a review of current knowledge and initial assessments. Front Public Health 2019;7:287. [CrossRef]
18. Centers for Disease Control and Prevention. Heated Tobacco Products. Available at: https://www.cdc.gov/tobacco/other-tobacco-products/heated-tobacco-products.html#cdc_generic_section_6-are-heated-tobacco-products-less-harmful-than-regular-cigarettes. Accessed June 19, 2026.
19. Scala M, Dallera G, Gorini G, Achille J, Havermans A, Neto C, et al. Patterns of use of heated tobacco products: a comprehensive systematic review. J Epidemiol 2025;35:213-21. [CrossRef]
20. Keller AM, Klosterhalfen S, Kastaun S, Kotz D. Heated tobacco product use prevalence and temporal trends among the German population: a series of representative cross-sectional household surveys, 2018-2023. BMJ Open 2025;15. [CrossRef]
21. Cheng HG, Noggle B, Vansickel AR, Largo EG, Magnani P. Tobacco use, risk perceptions, and characteristics of adults who used a Heated Tobacco Product (IQOS) in the United States: cross-sectional survey study. JMIR Form Res 2025;9. [CrossRef]
22. Majek P, Jankowski M, Nowak B, Macherski M, Nowak M, Gil A, et al. The frequency of use and harm perception of Heated Tobacco Products (HTPs): The 2019 cross-sectional survey among medical students from Poland. Int J Environ Res Public Health 2021;18:3381. [CrossRef]
23. Miller CR, Sutanto E, Smith DM, Hitchman SC, Gravely S, Yong HH, et al. Characterizing heated tobacco product use among adult cigarette smokers and nicotine vaping product users in the 2018 ITC four country smoking & vaping survey. Nicotine Tob Res 2022;24:493-502. [CrossRef]