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Why Do Physicians in Japan Use e-Cigarettes and/or Heated Tobacco Products? A Cross-Sectional Survey

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Abstract: Background: The tobacco industry has actively advocated for electronic cigarettes (e-cigarettes) and heated tobacco products (HTPs) as harm-reduction alternatives to traditional cigarettes. Around 40% of smoking physicians have adopted HTPs. This study aimed to uncover the motivations behind Japanese physicians' e-cigarette and HTP use while analyzing the associations between product use, physician demographics, lifestyles, and smoking preferences. Methods: A mail-based survey was conducted in 2020, targeting 6000 male and 1500 female physicians. From the 5492 survey participants, 346 physicians aged 28 to 98 who were current smokers were selected. The survey assessed their usage of e-cigarettes and HTPs and explored the reasons for initial adoption. A multivariate logistic regression analysis examined the relationships between product use, physician characteristics, and behaviors. Results: Approximately 33.8% of smoking physicians had experimented with e-cigarettes and HTPs. E-cigarette and HTP use correlated with youthfulness, nicotine addiction, and a history of medical treatment. The primary drivers for adopting e-cigarettes and HTPs were reduced odor (74.4%), perceived harm reduction (48.7%), and decreased exposure to secondhand smoke (29.1%). Conclusions: Physicians, when transitioning from conventional cigarettes to HTPs or e-cigarettes, are primarily motivated by a desire to reduce the odor of conventional cigarettes rather than health-related concerns.

Keywords: heated tobacco products; e-cigarettes; harm reduction; factors; Japan; physician; smoking

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1. Introduction

Tobacco smoking is a widely recognized risk factor for premature morbidity and mortality [1]. Ceasing smoking represents the optimal approach to mitigating health risks at all ages, with nicotine replacement therapy (NRT) being globally acknowledged as a primary method for smoking cessation [2]. Research has shown that NRT use elevates the smoking cessation rate by 50–60% [2]. Nevertheless, a considerable number of smokers, exceeding one billion individuals globally, continue smoking despite various tobacco control policies [3]. The concept of tobacco harm reduction was conceived as a complementary strategy to conventional tobacco control measures [4]. Approaches to tobacco harm reduction acknowledge smoking cessation as the ideal course of action but also consider alternative methods. The goal is to minimize harm and reduce overall mortality and morbidity while not necessarily eliminating the use of tobacco and nicotine [4].

Electronic cigarettes (e-cigarettes) and heated tobacco products (HTPs) have been marketed to consumers as harm-reduction alternatives to conventional cigarettes [5,6]. The adoption of these products has proliferated rapidly in numerous countries [7]. Japan in particular has emerged as a major market for HTPs, with estimated usage rates of 10.9% for HTPs and 25.9% for conventional cigarettes in 2020 [8]. Multiple studies have suggested that

e-cigarettes generate or contain fewer carcinogens than conventional cigarettes, potentially resulting in lower cancer risks for users [9,10]. Consequently, the UK National Health Service advocates e-cigarette use as an alternative to continued conventional cigarette use for adult smokers [7]. In contrast to some other nations, Japan has made relatively gradual progress in implementing tobacco control policies due to the close ties between the Japanese government and tobacco companies and significant tobacco tax revenues [11,12]. For instance, the Health Promotion Law in Japan enforces comparatively lenient regulations on the public use of HTPs compared to conventional cigarettes [8].

Consumer perceptions regarding the relative harmfulness of e-cigarettes or HTPs in comparison to conventional cigarettes are a significant determinant in initiating and sustaining product use. Smokers across various countries commonly turn to alternative nicotine products like e-cigarettes or HTPs when they perceive them as less detrimental than conventional cigarettes [13–17].

A narrative review indicated that e-cigarettes were consistently perceived as less harmful than conventional cigarettes [18]. Furthermore, a cross-sectional investigation demonstrated that the most prevalent motivation for HTP use in European countries was the belief in their reduced harm compared to smoking tobacco (39.5%) [19]. Similarly, a cross-sectional study targeting Japanese adult smokers found that HTP users were significantly more inclined to consider HTPs as less harmful than cigarettes in comparison to non-HTP users [13].

Nonetheless, the effectiveness of e-cigarettes in facilitating smoking cessation remains contentious [20–22]. The multitude of risks associated with e-cigarettes, particularly concerning adolescents, includes elevated rates of nicotine addiction, susceptibility to lung injury, potential cognitive function impairment, and an increased likelihood of turning to conventional cigarette use [23]. Despite having fewer toxicants and carcinogens compared to conventional cigarettes, e-cigarettes still entail exposure to these substances, including nicotine [23]. In contrast to conventional cigarettes, HTPs reduce harmful toxins and particulate matter [24]. However, there is insufficient evidence of the health effects of using HTPs [25]. Several systematic reviews and clinical studies have revealed distinctions in biomarkers between conventional cigarette and HTP users [26,27]. For example, positive changes in risk markers for clinical arteriosclerosis were noted in HTP users in comparison to conventional cigarette users [26]. Conversely, HTP exposure has been documented to modify mitochondrial function, potentially intensifying airway inflammation, airway remodeling, and the risk of lung cancer [26].

Similarly, there is insufficient evidence of the efficacy of HTPs in achieving successful smoking cessation. A study revealed that HTP use among Chinese users had no significant association with smoking cessation over six months [28]. In Japan, a study demonstrated that individuals using HTPs displayed a lower likelihood of quitting smoking compared to those using conventional cigarettes [29]. Among youth, these products have the potential risks of increasing the likelihood of being a future smoker, as HTPs are "bridging" products that lead non-smokers and poly-tobacco users to become conventional cigarette smokers [8,30,31]. Thus, HTPs are not devoid of risks, and there is no scientific evidence confirming their efficacy in aiding smoking cessation.

Physicians are widely regarded as leading promoters of smoking cessation [32]. However, many smoking physicians struggle with quitting [33]. Although the smoking prevalence among Japanese physicians is declining [34], a small percentage of physicians are still smokers. The prevalence of smoking among Japanese physicians was recently estimated to be 6.1%, of which 2.6% used HTPs [35]. Regarding the rationale for e-cigarette use, a cross-sectional analysis of Turkish physicians revealed that over 50% of physicians viewed e-cigarettes as part of a "harm reduction strategy" [36]. These statistics are particularly relevant given that physicians' smoking behaviors are associated with patients' smoking status [37]. With the increased use of e-cigarettes and HTPs among physicians, there is a likelihood of increased usage of these products among their patients. However, little is known about physicians' smoking behaviors and e-cigarette and/or HTP use. Examining

the smoking behavior of physicians who understand the harmful effects of smoking better than the general population may provide useful insights for future approaches to facilitate smoking cessation and harm reduction [35]. Thus, this study has the following two objectives: (a) to determine the reasons why physicians in Japan use e-cigarettes and/or HTP products and (b) to identify the association between physicians who use e-cigarettes and/or HTPs and their demographics, lifestyle, and smoking preferences.

2. Materials and Methods

2.1. Respondents and Procedures

This investigation utilized data from a cross-sectional survey conducted within the Japan Medical Association (JMA) membership. The survey, which spanned from January to August 2020, aimed to gauge the smoking attitudes and behaviors of JMA members. The participant cohort comprised physicians, totaling 7500 individuals, encompassing 6000 men and 1500 women, selected randomly from the larger population of 172,763 JMA members. To achieve random extraction, we employed systematic sampling. Initially, we established a roster ordered by medical registration number and categorized by sex. Subsequently, the initial survey participant was randomly chosen, and the following participants were systematically selected at uniform intervals. This approach effectively mitigated any potential biases related to age and region [37]. A subset of 137 individuals who did not receive the questionnaires was excluded due to factors like unknown addresses, hospitalization, or mortality. Ultimately, 5591 responses were collected but 99 were excluded due to incomplete data. Thus, the final sample encompassed 5492 respondents, resulting in a response rate of 74.6%. Within this group of survey participants, we focused exclusively on current smokers (N = 346, 6.3%, comprising 323 men and 23 women) in alignment with the study's objectives (refer to Figure 1 for a graphical representation). Further elaboration on the survey's design and content can be referenced elsewhere [35].

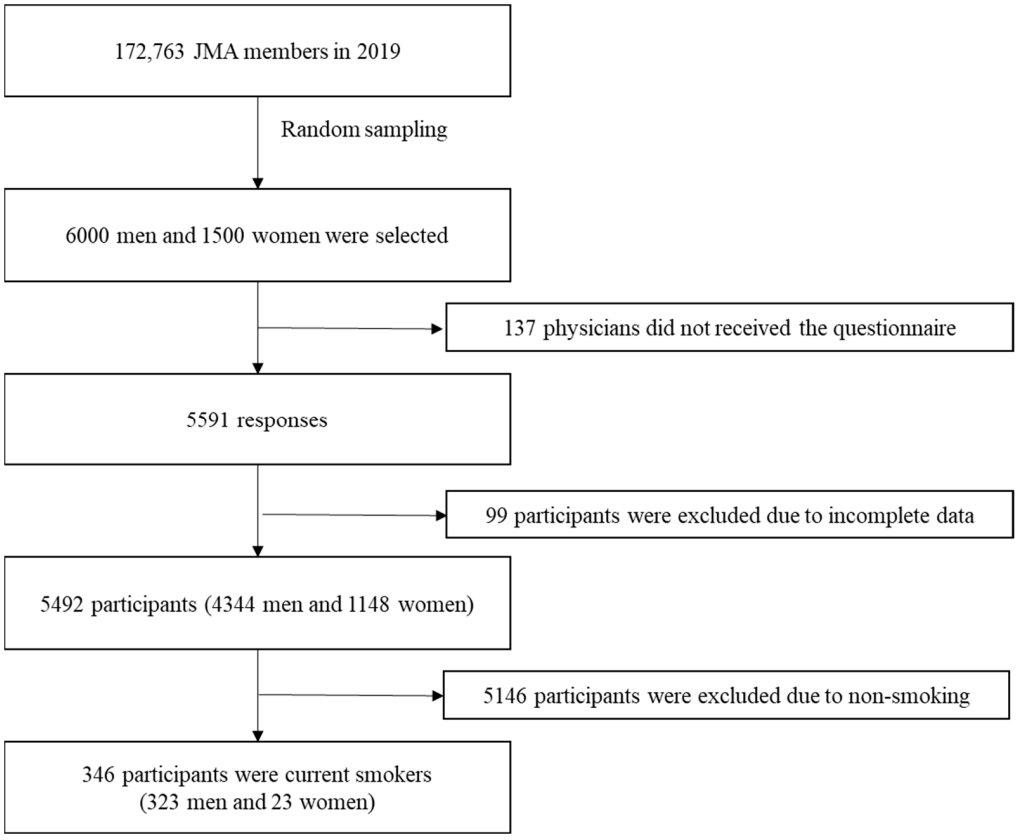

Figure 1. Flow Diagram of this Study.

2.2. Measures

A mailed anonymous self-administered questionnaire asked respondents about their demographic characteristics, smoking-related habits, and lifestyle. Information about respondents' characteristics included their sex (men, women), age group (24–39, 40–49, 50–59, 60–69, 70+), family member details (spouse, minor), specialty (internal medicine & pediatrics, surgery & orthopedics, others), frequency of night shifts per month (<4 days, ≥4 days), frequency of holidays per month (<4 days, ≥4 days), employment type (owner, employee), and work facility (clinics, hospitals, others).

Inquiries about smoking encompassed questions regarding the types of smoking products used in the preceding 30 days, including conventional cigarettes, HTPs, and e-cigarettes. Additionally, participants' nicotine addiction was assessed using the Tobacco Dependence Screener (TDS) [38,39], which consists of a battery of 10 smoking-related questions, each mandating a binary response selection, either "yes" or "no". The TDS score was subsequently derived as the count of affirmative, or "yes," responses. These scores span a range of 0 to 10, with a cutoff point established at 5 or higher to identify tobacco dependence (exhibiting a sensitivity of 0.95 and specificity of 0.81 following the diagnosis criteria outlined in the International Statistical Classification of Diseases and Related Health Problems-10) [39].

Regarding reasons for using e-cigarettes and/or HTPs among current smokers, the participants were asked, "Why did you start smoking HTPs or e-cigarettes?". Respondents had the option to select as many reasons as they wanted from the following list of nine possible reasons for HTP or e-cigarette use: (1) less harmful, (2) can be smoked in places where conventional cigarettes cannot be smoked, (3) less odorous, (4) recommended by friends and acquaintances, (5) heard about them from advertisements, (6) curiosity about them, (7) reduced secondhand smoke, (8) reduced conventional cigarette use, and (9) desire to quit smoking. These options were categorized into six broad themes—harm reduction, convenience, social consideration, personal interest, helping to reduce conventional cigarette use, and helping to quit smoking. These items were modified from previous studies targeting e-cigarettes and HTPs [40,41].

Respondents reported their lifestyle behaviors such as alcohol intake (men ≥40 g/day, women ≥20 g/day), sleep duration (<6 h, ≥6 h), skipping breakfast (yes, no), subjective health (poor, good), exercise habits (yes, no), chronic disease treatment (yes, no), and whether they had a medical examination in the past year (yes, no).

2.3. Data Analysis

First, descriptive statistics were summarized and compared according to the current smoking status. Second, differences in the reasons for starting e-cigarette and/or HTP use were calculated using χ^2 and Fisher's exact tests. Third, multivariate logistic regression analyses were conducted to survey the factors associated with current tobacco product use among smoking Japanese physicians, including the following potential determinants: age group, sex, nicotine addiction, heavy alcohol drinking, frequency of holidays per month, frequency of night shifts per month, medical examination, subjective health status, sleep duration, skipping breakfast, exercise, disease treatment, family members (spouse or minor), specialty, employment type, and work facility. Optimal models were constructed using a stepwise procedure involving backward elimination until all variables exhibited a p-value less than 0.20, effectively addressing collinearity concerns [42]. Missing data were systematically excluded from the analysis, a suitable approach given the limited number of predictors involved. The statistical analyses utilized Stata version 17.0 (StataCorp, College Station, TX, USA), with a predefined significance level of $p < 0.05$.

2.4. Ethical Consideration

The present study adheres to the STROBE cross-sectional reporting guidelines. Ethical approval for the study was obtained from the ethics committees of JMA and Nihon University School of Medicine, and the study strictly adhered to the Declaration of Helsinki,

ensuring the confidentiality of respondents (Approval No. R1-7). Respondents furnished written informed consent for their participation in the survey, which provided the dataset for this investigation.

3. Results

Out of the 346 current smokers, 66.2% (95% CI: 60.9–71.2%) were exclusively conventional cigarette smokers, 26.3% (95% CI: 21.7–31.3%) were solely e-cigarette and/or HTP users, and 7.5% (95% CI: 5.0–10.8%) were dual users (Table 1). Smokers' age, nicotine addiction, holidays, alcohol drinking status, and having a minor in the family significantly differed depending on smoking habits. Participants reporting exclusive e-cigarette and/or HTP user tended to be younger, nicotine addicts, had fewer holidays, were heavy alcohol consumers, consumed breakfast less frequently, engaged in lesser physical activity, and had family members who were minors (Table 1). Data regarding nicotine addiction from 16 respondents (4.6%), number of holidays from 4 respondents (1.2%), having the night shift from 10 respondents (2.9%), medical examination from 2 respondents (0.6%), alcohol intake from 1 respondent (0.3%), subjective health from 2 respondents (0.6%), sleep duration from 1 respondent (0.3%), skipping breakfast from 1 respondent (0.3%), exercise habits from 14 respondents (4.0%), disease treatment from 2 respondents (0.6%), having a spouse from 1 respondent (0.3%), medical department from 2 respondents (0.6%), employment type from 10 respondents (2.9%), and work facility from 1 respondent (0.3%) were missing.

Table 1. Demographic characteristics in percentage by physician smoking status.

	Total *N* = 346	**Conventional Cigarettes Only** *N* = 229	**HTPs or e-Cigarettes** *N* = 91	**Dual User** *N* = 26	***p*-Value**
Percentage		**66.2 (95% CI: 60.9–71.2)**	**26.3 (95% CI: 21.7–31.3)**	**7.5 (95% CI: 5.0–10.8)**	
Variables					
Sex					
Men	93.4	92.1	95.6	96.2	0.446
Women	6.6	7.9	4.4	3.8	
Age					
24–39	4.1	3.1	6.6	3.9	<0.001
40–49	14.2	8.7	28.6	11.5	
50–59	25.4	23.6	30.8	23.1	
60–69	34.4	35.8	27.5	46.2	
70 or more	22.0	28.8	6.6	15.4	
Nicotine addiction					
Yes	57.5	51.5	67.0	76.9	0.005
Holiday					
<4 days/month	33.8	28.8	48.4	26.9	0.003
Night shift					
≥4 days/month	12.7	9.6	18.7	19.2	0.052
Medical examination					
Yes	75.4	72.9	79.1	84.6	0.269
Alcohol					
Heavy drinking	30.6	26.2	40.7	34.6	0.037
Subjective health					
Poor	21.5	21.9	23.1	12.0	0.473
Sleep duration					
<6 h	19.9	17.9	20.9	34.6	0.125

Table 1. *Cont.*

	Total *N* = 346	**Conventional Cigarettes Only** *N* = 229	**HTPs or e-Cigarettes** *N* = 91	**Dual User** *N* = 26	***p*-Value**
Percentage		**66.2 (95% CI: 60.9–71.2)**	**26.3 (95% CI: 21.7–31.3)**	**7.5 (95% CI: 5.0–10.8)**	
Skipping breakfast					
No	78.3	79.5	73.6	84.6	0.374
Exercise habits					
Yes	37.3	38.4	34.1	38.5	0.761
Undergoing disease treatment					
Yes	58.7	58.1	57.1	69.2	0.518
Family member					
Spouse	91.0	90.8	93.4	84.6	0.377
Minor	28.9	23.1	44.0	26.9	0.001
Medical department					
Internal medicine & Pediatrics	36.9	36.4	41.1	26.9	0.099
Surgery & orthopedics	20.1	20.2	23.3	7.7	
Others	43.0	43.4	35.6	65.4	
Employment type					
Owner	60.4	60.7	60.4	57.7	0.414
Employee	36.7	35.4	39.6	38.5	
Facility					
Clinics	62.1	62.5	65.9	46.2	0.500
Hospitals	28.6	27.1	29.7	38.5	
Others	9.3	10.5	4.4	15.4	

Note. *p*-values were calculated according to smoking status using the χ^2 test and Fisher's exact test. Dual users were defined as smokers who used HTPs or e-cigarettes in addition to conventional cigarettes. Data regarding nicotine addiction from 16 respondents (4.6%), number of holidays from 4 respondents (1.2%), having the night shift from 10 respondents (2.9%), medical examination from 2 respondents (0.6%), alcohol intake from 1 respondent (0.3%), subjective health from 2 respondents (0.6%), sleep duration from 1 respondent (0.3%), skipping breakfast from 1 respondent (0.3%), exercise habits from 14 respondents (4.0%), disease treatment from 2 respondents (0.6%), having a spouse from 1 respondent (0.3%), medical department from 2 respondents (0.6%), employment type from 10 respondents (2.9%), and work facility from 1 respondent (0.3%) were missing.

To elucidate the connections between the utilization of the three distinct products and illustrate the overall count of respondents presently employing each product, we generated a Venn diagram (Figure 2). Conventional cigarettes constituted the most significant proportion, followed by HTPs and e-cigarettes. Only three physicians (0.87%) partook in all three products, while 26 physicians (7.5%) used a combination of the two. Additionally, there were 9 users of e-cigarettes containing nicotine, 13 users of nicotine-free e-cigarettes, and 1 user of e-cigarettes with and without nicotine.

Table 2 presents the percentages for smokers' various reasons for starting the use of e-cigarettes and/or HTPs. The main reasons for starting the use of these products were: less odorous (74.4%, 95% CI: 65.5–82.0%), less harmful (48.7%, 95% CI: 39.4–58.1%), and reduces secondhand smoke (29.1%, 95% CI: 21.0–38.2%). However, the proportion who reported "quit smoking" was considerably small (6.0%, 95% CI: 2.4–11.9%), especially among HTP users (4.0%, 95% CI: 1.1–9.8%). A higher percentage of e-cigarette users started to smoke in places where other cigarettes cannot be smoked (18.8%, 95% CI: 4.0–45.6%) and used e-cigarettes to reduce secondhand smoke (43.8%, 95% CI: 19.8–70.1%) and quit smoking (18.8%, 95% CI: 4.0–45.6%) compared to HTP users (Table 2).

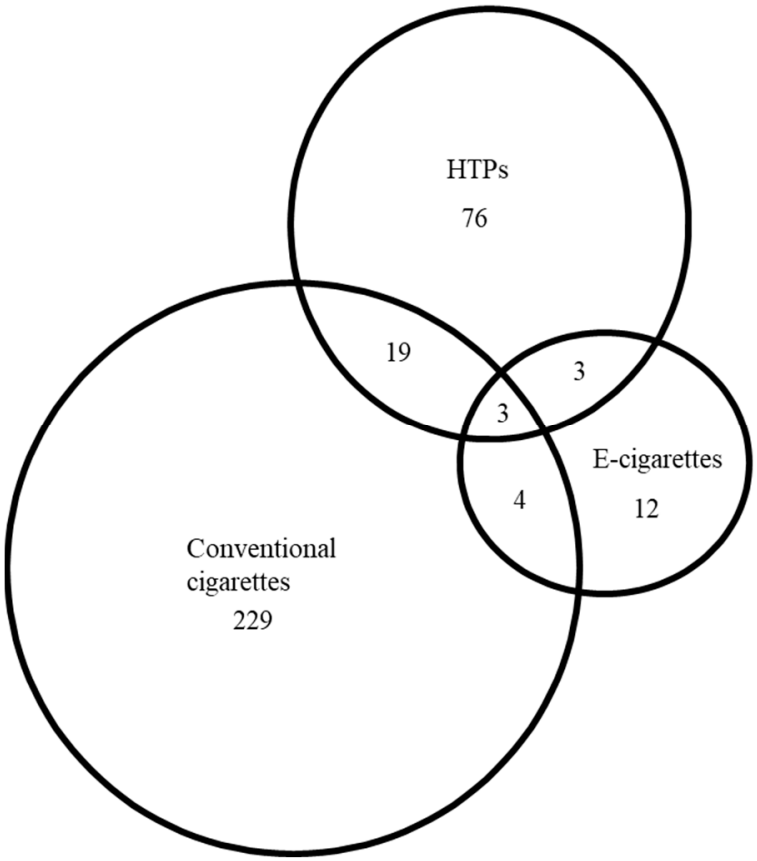

Figure 2. The number of current users of any products among physicians. In total, n = 346. The overlap areas represent those who used both or all; the non-overlap area indicates the total number of physicians who used each product exclusively. Abbreviations: HTPs = heated tobacco products.

Table 2. Reasons for starting to smoke HTPs or e-cigarettes.

	Current User (n = 117) (%)	**95% CI**	**HTPs (n = 101) (%)**	**95% CI**	**e-Cigarettes (n = 16) (%)**	**95% CI**	***p*-Value**
They were less odorous	74.4	65.5–82.0	76.2	66.7–84.1	62.5	35.4–84.8	0.168
They were less harmful	48.7	39.4–58.1	49.5	39.4–59.6	43.8	19.8–70.1	0.669
Reduce second-hand smoke	29.1	21.0–38.2	26.7	18.4–36.5	43.8	19.8–70.1	0.164
Were interested in them	17.1	10.8–25.2	18.8	11.7–27.8	6.3	0.2–30.2	0.193
Reduce the number of conventional cigarettes	14.5	8.7–22.2	14.9	8.6–23.3	12.5	1.6–38.3	0.579
Smoke in places where other cigarettes cannot be smoked	9.4	4.8–16.2	7.9	3.5–15.0	18.8	4.0–45.6	0.174
Recommended by friends and acquaintances	7.7	3.6–14.1	8.9	4.2–16.2	0.0		0.253
Quit smoking	6.0	2.4–11.9	4.0	1.1–9.8	18.8	4.0–45.6	0.053
Saw them on TV or advertisement	1.7	0.2–6.0	2.0	0.2–7.0	0.0		0.744

Note. HTP users were included along with HTP and/or e-cigarette users. Factors associated with the use of e-cigarettes and/or HTPs by smoking physicians are shown in Table 3. The odds ratios of e-cigarette and/or HTP users were significant among younger respondents, especially in the 40–49 age group (OR = 14.42, 95% CI: 5.33–38.98), compared to those over the age of 70 with nicotine addiction (OR = 1.90, 95% CI: 1.14–3.17) and having received disease treatment (OR = 1.93, 95% CI: 1.10–3.39).

Table 3. Factors associated with e-cigarette and/or HTP use among smoking physicians in Japan.

Variables	e-Cigarettes and/or HTPs (n = 117)			
	Odds Ratio	**95% CI**	**z**	***p*-Value**
Sex (ref women)				
Men	2.06	0.69–6.12	1.30	0.194
Age				
24–39	10.68	2.80–40.81	3.46	0.001
40–49	14.42	5.33–38.98	5.26	<0.001
50–59	5.52	2.35–12.97	3.92	<0.001
60–69	3.33	1.47–7.53	2.89	0.004
70 or more	1.00			
Nicotine addiction (ref No)				
Yes	1.90	1.14–3.17	2.47	0.013
Alcohol				
Heavy drinking	1.65	0.98–2.76	1.88	0.059
Treatment disease (ref No)				
Yes	1.93	1.10–3.39	2.30	0.021

Note. Multivariate logistic regression analyses with stepwise back backward elimination. Potential determinants: age group, sex, nicotine addiction, heavy alcohol drinking, holiday/month, night shift/month, medical examination, subjective health status, sleep duration, skipping breakfast, exercise, disease treatment, family member (spouse or minor), specialty, employment type, and work facility.

4. Discussion

To our knowledge, this investigation represents the inaugural examination of the determinants related to the utilization of e-cigarettes and/or HTPs among the subset of Japanese physicians who smoke. The primary discoveries of this study can be summarized as follows: (1) Approximately one third of the surveyed smoking physicians had used e-cigarettes and/or HTPs in the past 30 days. (2) The primary motivations behind the initiation of the use of these products encompass odor reduction, perceived harm mitigation, and decreased exposure to secondhand smoke. (3) Notably, the utilization of e-cigarettes and/or HTPs exhibited correlations with a younger age demographic, nicotine dependency, and a history of receiving medical treatment.

Consumer perceptions significantly influence the adoption of e-cigarettes and HTPs, with individuals often choosing these alternatives when they believe them to be less harmful than conventional cigarettes [13–19,43]. Our results were in alignment with these antecedent findings on harm reduction. Half of the current e-cigarette and/or HTP users believed that e-cigarettes and/or HTPs were less harmful than conventional cigarettes. Nonetheless, a cross-sectional study involving personnel at an Italian cancer hospital indicated that only 5% of smokers regarded e-cigarettes as less harmful than conventional cigarettes [44].

Physicians often serve as role models for health-related behaviors and significantly contribute to smoking cessation initiatives [32]. Notably, the smoking status of physicians was linked to discouraging HTP use among patients [35]. Even a small number of physicians who use e-cigarettes and/or HTPs can influence their patients' smoking behavior. Therefore, physicians must provide scientific evidence for the risk of e-cigarette and/or HTP use to instruct patients to quit smoking, regardless of smoking status. Thus, future studies need to collect detailed information on these products from physicians.

The causal pathways linking the use of these products with low-risk perceptions are still unclear. There are two possibilities for the association between product use and low-risk perceptions. First, using these products that do not cause identifiable health problems may cultivate lower risk perceptions. That is, individuals without health problems caused by using these products may be more likely to engage in using these products, which may then act as a gateway to the usage of conventional cigarettes. A study targeting adolescents in the Netherlands reported that e-cigarette use instead of conventional cigarettes

was associated with an increased likelihood of smoking traditional cigarettes [45]. Thus, it is essential to devise strategies for health and regulatory authorities to communicate and correct risks such as nicotine addiction and tobacco use to the general population. Second, lower risk perceptions of these products may lead to switching from conventional cigarettes. Health and regulatory authorities need to consider how conventional smokers are informed of the potential health benefits of switching to e-cigarettes and HTPs. Policymakers should carefully consider whether to account for the drawbacks, or rather the benefits, of e-cigarettes and/or HTPs for conventional smokers.

This study demonstrated that the proportion of people who use HTPs in places where other cigarettes cannot be smoked was relatively small. However, according to a study conducted in the US, the main reasons for e-cigarette use were cessation/health reasons (84.5%) and consideration of others (71.5%) [40]. In addition, as per a study conducted among HTP users in Mexico, approximately a quarter of the respondents considered using HTPs in places where other cigarettes cannot be smoked [46]. These findings suggested that most physicians who used e-cigarettes and/or HTPs did so for harm reduction but not for smoking cessation. Similar to the current findings, the majority of US physicians did not actively recommend e-cigarettes as a smoking cessation tool [47]. The results reflect the US FDA's decision regarding IQOS's (an HTP introduced by Philip Morris International) status as a modified risk tobacco product and advertisements by tobacco manufacturers. There is no scientific evidence regarding whether HTPs help people quit smoking.

Interestingly, this study suggested that the effects of mass media, recommendations by friends and acquaintances, and smoking in places where other cigarettes cannot be smoked were considerably low, which contrasts with the results of previous studies on the general population [48,49]. For example, popular TV programs triggered widespread HTP use in Japan [49]. IQOS packaging and stores are similar to those of Apple. The stylish images and the advertisement of smokeless products may provide an image of harm reduction and increase the appeal to younger generations [50]. Moreover, approximately 60% of current HTP smokers in Japan claimed that they were influenced by family or friends using HTPs [41]. Similarly, the most popular reason for using HTPs in Mexico was their social acceptability relative to cigarettes (50.6%) [46]. Thus, this study suggests that regarding e-cigarette and/or HTP use, Japanese physicians are less likely to be affected by mass media and surrounding people than the general population.

When comparing HTP users to e-cigarette users, no statistically significant disparities were observed in the motives driving the initiation of these products, possibly due to the limited sample size. It is essential to recognize that e-cigarettes containing nicotine have been proscribed in Japan under the Pharmaceutical Affairs Law, consequently rendering e-cigarette use relatively unpopular in the country. In addition, only one study, conducted in Mexico, has reported distinctions wherein HTP users placed greater emphasis on reasons such as "using these products to reduce cigarette consumption" and "perceived social acceptability compared to cigarettes" when contrasted with e-cigarette users [46]. Subsequent research endeavors should comprehensively explore and compare the distinctions between these user groups.

The current findings revealed an association between physicians who used HTPs at a younger age, nicotine addiction, and the presence of medical conditions. A study conducted on the general population in Japan has reported that HTP use correlated with a younger age, heavy alcohol consumption, higher educational attainment, and middle to high household incomes [51]. In a prior investigation, Japanese physicians displayed a low level of concern regarding nicotine addiction in patients using HTPs [35]. By contrast, the findings of this study suggest that individuals using both e-cigarettes and/or HTPs, as well as exclusive users of these products, tend to exhibit nicotine addiction. Similar findings were observed in the general Japanese population [52]. Previous research has consistently indicated that the majority of HTP users simultaneously continue smoking conventional cigarettes [13,14].

Building on earlier studies [40], the current study highlights the inclination of e-cigarette and/or HTP users to prioritize their health and seek products that mitigate health risks while still satisfying their habitual needs and nicotine dependency. When the tobacco industry markets e-cigarettes and HTPs as less detrimental than conventional cigarettes, they may attract a population with health-conscious inclinations [53]. Specifically, smoking physicians, particularly those grappling with nicotine dependence, may encounter challenges in their smoking cessation efforts [54]. While potentially perceived as less harmful, these products still contain chemical substances and carcinogens that can lead to adverse health effects [55].

Consequently, the medical community is tasked with the responsibility of disseminating information and popularizing the understanding that transitioning from conventional cigarettes to e-cigarettes and/or HTPs represents a transitional step, not the ultimate goal, which is the complete cessation of their use.

Several limitations were inherent in this study. First, the sample size was relatively small and the respondents' average age (60.7 years) exceeded the average age of all Japanese physicians (49.9 years) [56]. Consequently, there is potential for this study to have either underestimated or overestimated the descriptive statistics. Second, given the cross-sectional design, the capacity to make inferences regarding the causal relationships observed is inherently constrained. As a result, the causal link between the use of these products and low-risk perceptions remains unclear. Future research should endeavor to assess shifts in perceptions of these products and accumulate evidence about their health effects and subsequent smoking cessation by employing a cohort design. Third, this study was conducted during the initial stages of the COVID-19 pandemic. The precise influence of the pandemic on respondents' smoking behaviors remains indistinct. Fourth, this study did not consider the frequency of smoking and the nicotine content in tobacco and related products. Future studies need to survey detailed smoking information. Lastly, a substantial majority of the respondents were men. This discrepancy can be attributed to two key factors: (1) The male-to-female ratio among physicians in Japan is skewed, with 78.1% being men [56], thus resulting in a 4:1 male-to-female ratio; and (2) Among Japanese physicians, the prevalence of smoking stands at 7.1% among men and 2.1% among women [35]. In the interest of comprehensive analysis, future research initiatives should include a larger sample of female physicians.

5. Conclusions

This study suggests that physicians who use e-cigarettes and/or HTPs are more likely to self-select harm reduction but exhibit unfavorable conditions such as nicotine addiction and disease treatment. Thus, the findings implicate the need for spreading awareness that e-cigarette and/or HTP use may not reduce nicotine addiction. Medical professionals, even those who have transitioned from conventional cigarettes to e-cigarettes or HTPs, need to aim for harm reduction and ultimately support quitting smoking in any form. Simultaneously, it is important to understand the motivations behind the use of these products and the perspectives of users who are contemplating health-conscious decisions to provide support like nicotine replacement therapy along with behavioral counseling.

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