

# Smoking E-CigaRette and HEat-noT-burn products: validation of the SECRHET questionnaire

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## Abstract

**Background.** The nicotine market has rapidly evolved with the emergence of newer forms of smoking device that have been expanded worldwide, such as electronic cigarettes (eCig) which heat a solution (e-liquid) to create vapour and heat-not-burn (HNB) tobacco products, which heats tobacco at a temperature below the point of combustion. Their use is increasing at an alarming rate; it is believed it will surpass the use of traditional cigarettes in next 5 years, mostly among never-smokers and young people.

**Objective.** There are not many studies investigating knowledge and behaviour about heat tobacco products (HTP) among teenagers, so the aim of this study is to validate the SECRHET questionnaire (Smoking E-CigaRette and HEat-noT-burn products) on knowledge and behaviour on cigarette and HTP among youth.

**Methods.** The study was conducted in February and March 2019 inside Sapienza University of Rome and high school Giulio Cesare of Rome. A self-administered anonymous questionnaire was performed to investigate smoking habits and measures knowledge about HTP among Italian teenagers.

**Outcomes.** A sample of 60 students took part in the validation of the questionnaire. The overall Cronbach's alpha was 0,635, corresponding to a sufficient reliability.

**Conclusion.** There is little or no data on consumption or perceptions of HTP products among youth and evidence suggests the usefulness of a standardized and validated questionnaire available to monitoring of awareness, interest in trying and prevalence of use of these novel products among young people. *Clin Ter 2019; 170(4):e247-251. doi: 10.7417/CT.2019.2142*

**Key words:** smoking, heat tobacco products, electronic cigarettes, heat-not-burn products, young people

## Introduction

The World Health Organization has defined tobacco smoke as "the greatest health threat".

Cigarette smoking is not only associated with the well-known damages to the respiratory system: it can also have

repercussions, for example, on the central nervous system; in particular, it can be associated with the development of multiple sclerosis (1).

Deaths and diseases related to direct exposure to tobacco and passive smoking are predictable and preventable through the implementation of interventions aimed at combating smoking in public places and, above all, raising awareness and health education based on preventing smoking initiation and promoting smoking cessation.

Socio-economic factors can play an important role in influencing smoking cessation, and the level of Positivity has a strong role in determining this achievement, therefore social interventions may encourage stop smoking and avoiding craving to smoke (2).

Some thoughts must be cited to mention the role of the healthcare personnel in increasing smoking cessation rates among smokers.

A survey conducted in Lithuania in 2016 demonstrated limited knowledge of family doctors in relation to epidemiological aspects of tobacco use and effective cessation assistance methods (3).

On the other hand, there is limited evidence on the efficacy and effectiveness of electronic cigarette in increasing smoking cessation in a stable way (4) and the impact of health warnings among adolescents (5). Whereas the smokers have high probability to put attention or see the warnings on their tobacco's package, teens (smokers or not) don't have the same probability to note them and sometimes they have never seen them.

In this contest, the nicotine market has rapidly evolved with the emergence of newer forms of smoking device that have been expanded worldwide, based on switching smokers to use alternative products which are marketed as less dangerous than conventional cigarettes (6).

The first products introduced were electronic nicotine/non-nicotine delivery systems commonly known as electronic cigarettes (eCig) which heat a solution (e-liquid) to create vapour (7). eCig vaping is comparatively new but its use is increasing at an alarming rate; it is believed it will surpass the use of traditional cigarettes in next 5 years, with global sales reaching US\$ 10 billion (8).

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Subsequently, a new generation of nicotine products emerged under the definition of heat-not-burn (HNB) tobacco products, which heats tobacco at a temperature below the point of combustion, so that consumers inhale an aerosol rather than smoke (9).

While e-cigarettes heat nicotine from a liquid solution, HNB are disposable tobacco sticks equipped with an electronic device that heats the product, without burning, to generate an aerosol containing nicotine. Although heat-tobacco-products (HTP) are seen as an incentive for smoking cessation in smokers, emerging data shows that eCig use, particularly in the young, is associated with future cigarette use (10). Data from the 2011–2018 National Youth Tobacco Survey (NYTS), a cross-sectional, voluntary, school-based, self-administered, pencil-and-paper survey of U.S. middle and high school students indicates current e-cigarette use increased by 78% (from 11,7% in 2011 to 20,8% in 2018) among high school students, and increased by 48% (from 3,3% to 4,9%) among middle school students (11). Similarly, over half of the people interested in HNB are never-smokers (12). Therefore, both eCigs and HNB may represent a gateway for nicotine addiction among never-smokers rather than a substitute used for harm-reduction purposes in current smokers (12).

Due to aggressive marketing activities by the tobacco industry, awareness, experience and use of heated tobacco products, particularly among young adults, have rapidly increased.

The mean reason for the diffusion of this marketing is probably that HTP are perceived to be less injurious than tobacco cigarettes since they do not burn, reducing exposure to harmful products resulting from the burning of tobacco.

However, there is little or no data on use or perceptions of HTP products among them and rather evidence from independent research examining these novel products, although is limited, shows worrying associations between HTP aerosol exposure and impaired vascular endothelial function (13), pulmonary effects (14) and liver toxicity (15). Recently, an Australian study demonstrates that HNB devices can alter vital physiological functions in the lung (16). Moreover, it seems that the smoke of the e-cig decreases the quality of the air in enclosed spaces, and from an Italian study came the proposal to define it “environmental electronic smoke”, “electronic-second-hand smoke” and “electronic-third-hand smoke”, respectively (4).

The current state, it is reasonable to not consider them a safer option than cigarette smoking or eCig vaping and it is not to be supported the recommendation of their use over other nicotine delivery products.

There are not many studies investigating knowledge and behaviour about HTP among teenagers,

so the aim of this study is to validate the SECRHET questionnaire (Smoking E-CigaRette and HEat-noT-burn products) on knowledge and behaviour on cigarette smoking and on HTP among youth.

## Methods

### Sample

The survey investigated smoking habits and knowledge about HTP among Italian students of high schools and universities. The participation in the research was absolutely voluntary.

### Description of the tool

A self-administered anonymous questionnaire was used to collect information.

It was divided in four main sections for a total of twenty items:

- the first section was on demographic characteristics (age, gender, region of residence) and physical activity (sedentary versus amateur/competitive sports activity);
- the second part was related to the personal relationship with smoking (“How many times have you smoked in the last 30 days?”, “Have you ever vaped electronic cigarettes?”, “Have you ever used heat-not-burn products?”);
- the third part concerned knowledge about HTP (“Do you know what happens to tobacco when you use a heat-not-burn product?”, “Do you think electronic cigarettes create addiction?”, “Are products that use heated tobacco harmful to health?”, “Are electronic cigarettes harmful to health?”, “Have you ever heard of products that use heated tobacco?”, “Is nicotine present in products that use heated tobacco?”);
- the last section investigated on measures of susceptibility established for HTP (“If one of your best friends were to offer you a Heat Tobacco Product, would you try it?”, “Would you recommend using products that use heated tobacco to a person who wants to stop smoking?”).

At the end of data collection, seven questions were selected as they were the only ones with a dichotomous answer (and therefore useful for the purposes of analysis).

The internal consistency analysis was carried out on this seven questions (Table 1).

Table 1. The seven questions for students included in the test<sup>a</sup>.

1. Do you think electronic cigarettes create addiction? <input type="checkbox"/> Yes <input type="checkbox"/> No
2. Are electronic cigarettes harmful to health? <input type="checkbox"/> Yes <input type="checkbox"/> No
3. Have you ever heard of products that use heated tobacco? <input type="checkbox"/> Yes <input type="checkbox"/> No
4. Is nicotine present in products that use heated tobacco? <input type="checkbox"/> Yes <input type="checkbox"/> No
5. Are products that use heated tobacco harmful to health? <input type="checkbox"/> Yes <input type="checkbox"/> No
6. Would you recommend using products that use heated tobacco to a person who wants to stop smoking? <input type="checkbox"/> Yes <input type="checkbox"/> No
7. If one of your best friends offers you a product that uses heated tobacco, would you accept it? <input type="checkbox"/> Yes <input type="checkbox"/> No

<sup>a</sup>The Italian version of the questionnaire is available contacting the authors of this publication.

### Setting

The study was conducted in February and March 2019 at a high-school of Rome (Liceo Classico Statale Giulio Cesare) and at Sapienza University of Rome. In particular it was performed in the Faculty of Law and in the library of the Department of Public Health and Infectious Diseases.

### Reliability of the tool

The preliminary assessment of the tool was performed considering a small sample (N=19) who was invited to note possible inconsistent or unclear items of the questionnaire. Based on feedback received from this sample, followed improvements were made to the questions in order to increase their usability:

- Removed questions: the two questions relating to the type of school and the year of attendance were removed (“In what kind of school are you enrolled?”, “What year do you attend?”) to make the questionnaire available in all its parts also by universities;
- New options: new possible answer options were added to questions “What do you think of people who smoke cigarettes?” and “What do you think of people who smoke electronic cigarettes?”, to give the participants a wider possibility of response and get opinions more responsive to reality;
- More precise questions: in the question concerning the habit of smoking in the family environment, a detail was added: “In your family, excluding you if you are a smoker, does someone smoke?”. In this way, it was specified that the question wants to investigate only the rest of the family and not the participant in the study, which in this specific question is not considered.

### Statistical analysis

The descriptive statistics was performed using frequencies and percentages for qualitative variables while means with standard deviation (SD) and median with interquartile range (IQR) were computed for quantitative variables (age). The internal consistency of the questionnaire was assessed using the Cronbach’s alpha. In addition, for checking whether any item was not consistent with the rest of the scale, and could thus can be discarded, a reliability analysis was performed. The item-total correlation and the variability of the alpha between items, adding and eliminating items one at a time, was performed. Higher the score and more reliable the generated scale is. The scientific publications have indicated 0,7 to be an acceptable reliability coefficient (17).

The level of significance was set at  $p < 0,05$ .

The analysis was conducted using SPSS 25.0 for Windows.

### Results

A total of 65 questionnaires were administered and the response rate was 92% (N=60).

Respondents were mainly female (55%) with a mean age of  $19,96 \pm 3,162$  and a median age of 19 (IQR 17-22). The features of the sample are shown in Table 2.

Table 2. Characteristics of the sample

Variables		N.	%
Gender	Male	33	45
	Female	27	55
Age classes	16-18 years	21	35,1
	19-21 years	18	30
	22-24 years	9	15
	25-27 years	4	6,7
	28-30 years	1	1,7
	missing	7	11,7
Area of residence	North Italy <sup>1</sup>	1	1,7
	Centre Italy <sup>2</sup>	47	78,4
	South Italy <sup>3</sup>	11	18,3
	missing	1	1,7
Physical activity	sedentary	5	8,3
	competitive level	23	38,3
	amateur level	31	51,7
	missing	59	98,3

<sup>1</sup> Valle d’Aosta, Piemonte, Lombardia, Liguria, Friuli-Venezia Giulia, Veneto, Trentino-Alto Adige, Emilia-Romagna

<sup>2</sup> Toscana, Marche, Lazio, Umbria

<sup>3</sup> Abruzzo, Molise, Campania, Basilicata, Puglia, Calabria, Sicilia, Sardegna

Regarding smoking habits, 26 students (43,3%) said they had never smoked in the last 30 days while 17 declared a daily consumption. Regarding the use of HTP, 2 people (3,3%) admitted regular consumption of electronic cigarettes and 11 (18,3%) of HNB. The results are shown in Table 3.

Table 3. Personal relationship with smoking

Questions		N.	%
How many times have you smoked in the last 30 days?	never	26	43,3
	1-2 days	3	5,0
	3-5 days	2	3,3
	6-9 days	3	5,0
	10-19 days	0	0
	20-29 days	9	15
	everyday	17	28,3
Have you ever vaped electronic cigarettes?	never	27	45
	occasionally	26	43,3
	formerly	4	6,7
	regularly	2	3,3
	missing	1	1,7
Have you ever used heat-not-burn products?	never	39	65
	occasionally	9	15
	formerly	1	1,7
	regularly	11	18,3

Table 4. Knowledge and susceptibility about Heat Tobacco Products

Questions		N.	%
Do you know what happens to tobacco when you use a heat-not-burn product?	burns	8	13,3
	remains at room temperature	1	1,7
	heats not burns	33	55
	I don't know	18	30
Do you think electronic cigarettes create addiction?	Yes	35	58,3
	No	25	41,7
Are electronic cigarettes harmful to health?	Yes	37	61,7
	No	23	38,3
Have you ever heard of products that use heated tobacco?	Yes	45	75
	No	15	25
Is nicotine present in products that use heated tobacco?	Yes	39	65
	No	21	35
Are products that use heated tobacco harmful to health?	Yes	40	66,7
	No	20	33,3
If one of your best friends were to offer you a Heat Tobacco Product, would you try it?	Yes	24	40
	No	34	56,7
	missing	2	3,3
Would you recommend using products that use heated tobacco to a person who wants to stop smoking?	Yes	19	31,7
	No	41	68,3

Most participants (37 students for eCig and 40 for HNB) consider HTP to be harmful to health, while a considerable number (24 students) would accept one of these products offered by a friend, as can be seen in more detail in Table 4.

The overall Cronbach's alpha (on 7 selected items) was 0,635, corresponding to a sufficient reliability (Table 5). The elimination of the second element ("Are electronic cigarettes harmful to health?") increased alpha from 0,635 to 0,682 (Inter Item Correlation= 0,078) with a sufficient reliability level.

## Discussion

The results obtained from the validation of the SE-CRHET questionnaire, although obtained from a small sample, show a sufficient degree of reliability.

Table 5. Item-total correlation and variability of standardized Cronbach's alpha if one item was deleted

Items*	Corrected item-total correlation	Cronbach's alpha if the element is deleted
1	0,327	0,604
2	0,078	0,682
3	0,469	0,559
4	0,672	0,484
5	0,579	0,518
6	0,186	0,645
7	0,186	0,645

The overall Cronbach's Alpha based on standardized items is 0,635

\* The number correspond to the sentences showed in Table 1.

Indeed, the seven dichotomous questions made Cronbach's alpha at a sufficient reliability, and when the second question was deleted the level has improved with a fully sufficient score.

It is certainly necessary to expand the sample in order to provide a standardized and validated questionnaire available to monitoring of awareness, interest in trying and prevalence of use of HTP among young people.

In 2017, a web-based cohort survey of people aged 16–19 years from Canada, England and the USA revealed that awareness of HNB among youth is emerging within these countries and that interest in trying these products is very high among smokers, but also present among non-smokers (18).

In January 2018, the US FDA Tobacco Products Scientific Advisory Committee (TPSAC) expressed a range of opinions regarding the likelihood that youth never-smokers would become established users of the HNB products, and noted the absence of data among youth (19). Indeed, virtually all of the existing evidence on use of HTP has focused on adults and established tobacco users.

In Japan, where HTP have been available since 2014, several surveys indicate greater rates of use among younger individuals (20). Evidence suggests that packaging and marketing may have particular appeal among teenagers and young adults, given the important role that technology plays in their lives (21). So investigating their susceptibility and perceptions of these different products may help inform and prevent the use of substances by young people.

Further research is required to better understand the potential health impacts of these novel products that both smokers and non-smokers consider less harmful and think they would help them quit smoking.

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