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Consumption and level of knowledge about electronic cigarettes among medical students

Consumo e nível de conhecimento sobre o cigarro eletrônico entre estudantes de medicina

Consumo y nivel de concimiento sobre cigarrillos eletronica entre estudiantes de medicina

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Isadora Mônica Ponte de Oliveira
ORCID: https://orcid.org/0000-0003-2773-201X
Centro Universitário Christus, Brazil
E-mail: isadoraponte15@gmail.com
Alan Bessa Aguiar
ORCID: https://orcid.org/0000-0002-0679-0133
Centro Universitário Christus, Brazil
E-mail: alanaguiarr123@gmail.com
Sofia Dantas Pinto Monteiro
ORCID: https://orcid.org/0009-0003-2754-6257
Centro Universitário Christus, Brazil
E-mail: sofiadapimo@gmail.com
José de Ribamar Barroso Jucá Neto
ORCID: https://orcid.org/0000-0003-2750-7621
Centro Universitário Christus, Brazil
E-mail: juca.neto.medicina@gmail.com
Francisco Glauco de Azevedo Carvalho Filho
ORCID: https://orcid.org/0009-0002-5478-7884
Centro Universitário Christus, Brazil
E-mail: glauco729@gmail.com
Manuella Mendonça da Silva
ORCID: https://orcid.org/0000-0001-5799-2678
Centro Universitário Christus, Brazil
E-mail: manuellamds@outlook.com
Bianca Melo de Santana
ORCID: https://orcid.org/0009-0003-3733-440X
Centro Universitário Christus, Brazil
E-mail: biancamelosantana@gmail.com
Brayon Freire Blanquett Vidal
ORCID: https://orcid.org/0000-0001-9409-1887
Centro Universitário Christus, Brazil
E-mail: brayon.blanquett@hotmail.com
Luiza Targino Studart
ORCID: https://orcid.org/0009-0002-6792-3590
Centro Universitário Christus, Brazil
E-mail: luizastudart22@gmail.com
Pedro Iughetti Morais
ORCID: https://orcid.org/0000-0003-0594-6180
Centro Universitário Christus, Brazil
E-mail: pedroiughettimed@gmail.com
Raul Sancho de Carvalho Rocha
ORCID: https://orcid.org/0000-0003-4203-8405
Centro Universitário Christus, Brazil
E-mail: raulrocha18@gmail.com
Maria Clara Borges Girão Peixoto
ORCID: https://orcid.org/0000-0002-2518-1122
Centro Universitário Christus, Brazil
E-mail: clarabgirao@gmail.com
Aston Alves de Freitas
ORCID: https://orcid.org/0009-0002-6792-3590
Centro Universitário Christus, Brazil
E-mail: astondefreitas@gmail.com
Ana Laís Lacerda Rulim
ORCID: https://orcid.org/0000-0001-5968-410X
Centro Universitário Christus, Brazil
E-mail: analaislacerda@gmail.com

Simone Castelo Branco Fortaleza
ORCID: https://orcid.org/0009-0009-4596-8465
Centro Universitário Christus, Brazil
E-mail: simonefortaleza@gmail.com

Abstract
Objectives: Considering the increased prevalence of electronic cigarette use and its consequences on the health of users, this study was designed to evaluate the use and knowledge of EC among medical students at a university center in Northeastern Brazil. Methods: This is a cross-sectional observational study, in which sociodemographic data were collected through questionnaires applied to medical students from the first to the twelfth semester. Results: The survey included the participation of 248 students. It was observed that 25 undergraduates (10.1%) claimed to have high understanding about EC, 116 (46.8%) reported to have medium understanding, and 94 (37.9%) low level of knowledge. Furthermore, more than half of the students (53.2%) have already made use of the device. Of these, 38.7% reported vaporizing eventually and 14.5% vaporized daily. Conclusion: Therefore, we highlight the importance of an earlier and more complete approach about the harms of EC to undergraduate medical students to make them partners in the dissemination of information to lay people, including students from other courses and patients.
Keywords: EVALI; Eletronic cigarette; Smoking; Epidemiology.

Resumo
Objetivos: Considerando o aumento da prevalência do uso de cigarro eletrônico e suas consequências na saúde dos usuários, este estudo foi desenhado para avaliar o uso e o conhecimento sobre CE entre estudantes de medicina de um centro universitário do Nordeste do Brasil. Métodos: Trata-se de um estudo observacional transversal, no qual foram coletados dados sociodemográficos por meio de questionários aplicados a estudantes de medicina do primeiro ao décimo segundo semestre. Resultados: A pesquisa contou com a participação de 248 estudantes. Observou-se que 25 graduandos (10,1%) afirmaram ter alto conhecimento sobre CE, 116 (46,8%) relataram ter médio entendimento e 94 (37,9%) baixo nível de conhecimento. Além disso, mais da metade dos estudantes (53,2%) já fizeram uso do aparelho. Destes, 38,7% relataram vaporizar eventualmente e 14,5% vaporizar diariamente. Conclusão: Destacamos, portanto, a importância de uma abordagem mais precoce e completa sobre os malefícios da CE aos estudantes de graduação em medicina, para torná-los parceiros na divulgação de informações a leigos, incluindo estudantes de outros cursos e pacientes.
Palavras-chave: EVALI; Cigarro eletrônico; Tabagismo; Epidemiologia.

Resumen
Objetivos: Considerando la creciente prevalencia del uso de cigarrillos electrónicos y sus consecuencias en la salud de los usuarios, este estudio fue diseñado para evaluar el uso y el conocimiento de la AE entre estudiantes de medicina de un centro universitario del Nordeste de Brasil. Métodos: Se trata de un estudio observacional transversal, en el que se recolectaron datos sociodemográficos a través de cuestionarios aplicados a estudiantes de medicina del primero al duodécimo semestre. Resultados: La encuesta contó con la participación de 248 estudiantes. Se observó que 25 estudiantes (10,1%) afirmaron tener un nivel alto de conocimiento sobre AE, 116 (46,8%) reportaron un nivel medio de conocimiento y 94 (37,9%) un nivel bajo de conocimiento. Además, más de la mitad de los estudiantes (53,2%) ya han hecho uso del dispositivo. De ellos, el 38,7% informó vaporizar eventualmente y el 14,5% vaporizar diariamente. Conclusión: Por lo tanto, destacamos la importancia de un abordaje más temprano y más completo sobre los daños de la AE a los estudiantes de medicina para convertirlos en socios en la difusión de información a los legos, incluidos estudiantes de otros cursos y pacientes.
Palabras clave: EVALI; Cigarrillo eletrónico; Tabagismo; Epidemiología.

1. Introduction

Smoking is considered a universal public health problem, as it is one of the main causes of preventable deaths, according to the World Health Organization (WHO) (World Health Organization). In Brazil, about 220 thousand people die each year from causes related to tobacco use (Instituto Nacional do Cancer - INCA, 2022). Although the harm is widely disseminated by health institutions, the difficulty in smoking cessation is related to the chemical properties of nicotine that cause dependence, since it is a psychoactive substance that improves attention, stress and stabilizes mood, among other actions (Hughes et al, 2004).

The mobilization of organizations in the fight against smoking generated a paradigm shift in the way the industrial cigarette was seen. In this context, the tobacco industry saw itself threatened and sought to diversify its products, launching the

first electronic cigarette (EC), produced in China in 2003 and introduced in the United States in 2006 (Winnicka et al., 2020). The proposal was presented as a new inhalation product under the guise of alternative nicotine replacement treatment for individuals who wished to quit smoking (Cahn et al., 2011).

What purported to be an alternative model for smoking cessation, however, had the opposite effect. In addition to not proving effective for smoking cessation (Hamberger et al., 2020), electronic cigarette devices became popular, especially among young adults. In Brazil, about 80% of the people who have used electronic cigarette are between 18 and 34 years old, and 1 in 5 young people aged 18 to 24 have used this device. In all, it is estimated that 2.32% of the Brazilian population makes recurrent use, either daily or occasionally (Bertoni et al., 2021).

The electronic cigarette (EC, vape, or e-cigarette), consists of three main components: battery, atomizer and cartridge, which contains nicotine in varying concentrations, in addition to attractive flavorings, such as essence of chocolate, citrus, among others. Some of these electronic devices are shaped like objects of daily use, such as a pen drive (Cahn et al., 2011).

Despite the growing increase in EC users, the dissemination of potential risks caused by the device is still low. One of the complications is an entity known as EVALI (e-cigarette or vaping product use-associated lung injury). Of recent emergence, the disease is characterized by a set of signs and symptoms that include: cough, dyspnea, fever, malaise, abdominal pain, nausea and vomiting, associated with leukocytosis and radiological findings suggestive of lung injury.The Centers for Disease Control and Prevention (CDC) reported 1,080 cases of EVALI in 2019, including 18 deaths (Winnicka et al., 2020).

Given the increasing uptake of EC, especially in the young population, the present study aims to assess the prevalence of EC use and the level of knowledge among medical students about the harms involved with the drug, and whether the topic was addressed effectively during the undergraduate period.

2. Methodology

This is an observational, cross-sectional and descriptive study (Rother, E.T; 2007; Snyder, H.; 2019), carried out with a sample of 248 medical students from the first to the twelfth semester at a university center in Ceará, Brazil. The present study was submitted to the ethics and research council with approval according to opinion number 5.164.693 and CAAE 53162521.7.0000.5049.

Data collection was carried out between January 2022 and March 2022, using a questionnaire on the Google Forms platform. All participants consented to the research by agreeing to the Free and Informed Consent Form (ICF). Students who had incomplete questionnaires were excluded from the research.

The questionnaire was carried out with multiple-choice and single-answer questions and was divided into four sessions: sociodemographic data (which included age and semester), use of the EC, knowledge about the EC and knowledge about EVALI.

To calculate the sample size, according to the work of Guckert (2019) (12), a minimum significant sample size of 158 participants was calculated. Regarding the use of CE, the questions were adapted from an existing questionnaire in the literature, which is based on studies by Guckert (2019) (Soneji et al., 2017) and Belissario et al. (2020) (Corrêa De Oliveira et al., 2018) which contains questions about EC use and vaping frequency.

3. Results

The survey included the participation of 248 medical students, from the first to the tenth semester, with a mean age of +22.8 years (Table 1).

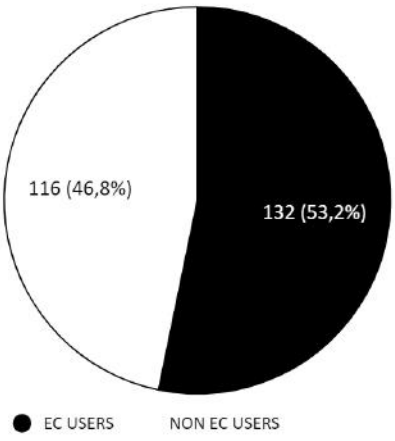
Table 1 - Characteristics of the evaluated sample.

	n=248
Age (years)	22,8
Sex	
Male	84/33,9%
Female	164/66,1%
Race	
White	165/66,5%
Brown	73/29,4%
Black	6/2,4%
Other	3/1,2%
Semester	
1-3º	84/33,9%
4-6º	87/35,1%
7-8º	62/25%
10-12º	15/6%

Source: Authors' own elaboration.

Regarding the use of electronic cigarettes, more than half of the evaluated students 132 (53.2%) had already done so, and among them, 51 (38.7%) said they vaporized eventually, however, 19 students (14.5%) vaporized daily (Graph 1).

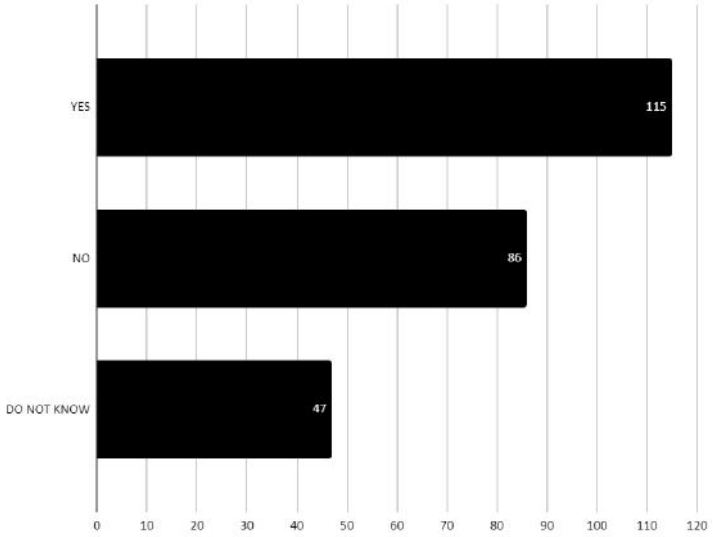
Graph 1 - Proportion of ec users and non users in the study sample.



Source: Authors' own elaboration.

Regarding the use of EC as an option to help smokers quit smoking, 115 students (46.4%) stated that this method is effective, 86 (34.7%) ineffective, and 47 (19%) could not answer this question (Graph 2).

Graph 2 - Student's answers to the question: does the use of ec helps in quitting smoking?

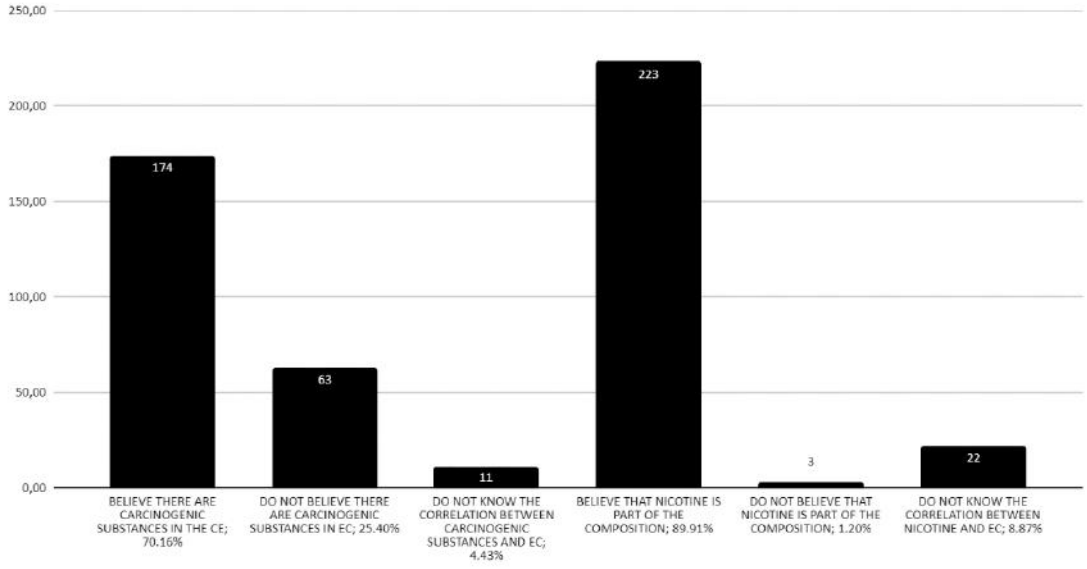


Source: Authors' own elaboration.

Regarding passive smoking, 135 (54.4%) students said that exposure to EC is a form of secondhand smoke, 30 (12.1%) said there is no relationship, while 83 (33.5%) could not answer.

Regarding the composition of FB, 174 (70.2%) of the evaluated students said that there are carcinogenic substances and 223 (89.9%) that nicotine is present among the components of FB (Graph 3).

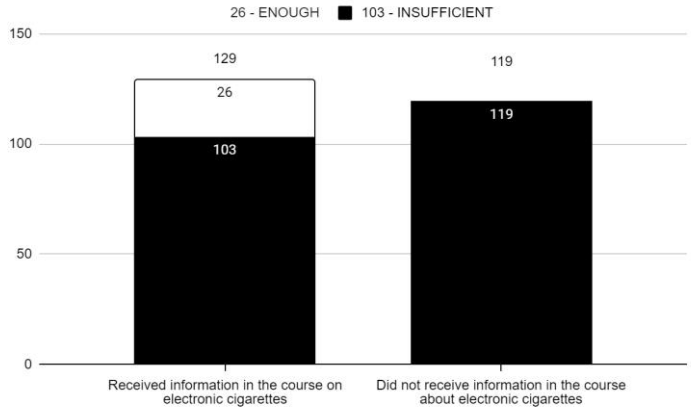
Graph 3 - Level of knowledge about electronic cigarette composition (ec).



Source: Authors' own elaboration.

Regarding the information received in the medical course about EC, 129 (52%) students stated that they had received information about the risks of these on health, however, among them, 80% (103) considered it insufficient (Graph 04).

Graph 4 – Quality of information received.



Source: Authors' own elaboration.

About the knowledge of EVALI, its cause and symptoms, 133 (53.6%) did not know about EVALI, while 115 (46.4%) said they knew about it. When asked about the use of EC causing EVALI, 128 students (51.6%) believed there was a correlation between the use of EC and EVALI.

4. Discussion

Despite the reduction in the consumption of conventional cigarettes on the world scene, the advent of electronic cigarettes has culminated in a certain transition in the profile of users. The initial motion of the tobacco industry proposed the use of ECs as an alternative therapy for nicotine replacement, as an adjuvant treatment for smoking cessation. However, besides not having proven effective for this purpose, it brought with it the adherence of the young public. National data showed that 2.4 million of the Brazilian adult population have used EC at least once in their lives, highlighting the predominance of young people (Bertoni et al., 2021; Fadus et al., 2019; Bertoni et al., 2019).

In this context, the present study evaluated the prevalence of vaper use among medical students and the knowledge about EC and EVALI received during the course.

When comparing the prevalence of EC use of the current study with international references, a very significant proportion of users was evidenced. While in the present study 48.4% of medical students had used EC at least once, the prevalence in a subgroup of students of the same course in the United States was 14.9%, i.e., about seven times lower than in our study sample, highlighting the urgency of public policies and awareness of the harms in our population (Ruppel et al., 2021).

The use of EC among young people can be attributed, above all, to the factors related to experimentation and recreation (Bhalerao et al., 2019; Soneji et al., 2017), added to the belief that electronic devices are less harmful to health (Corrêa De Oliveira et al., 2018), and the biopsychosocial aspects, which, in fact, are common to smokers, such as the belief of strengthening their individual identity, the entry into adulthood and the peak of their maturity (States., 2012). All these conditions in consonance, along with the stimulatory effects of the central nervous system caused by nicotine, culminate in the dependence of these individuals, which is composed of a triad: physical dependence - identified by the set of signs and symptoms, such as craving and withdrawal syndrome - behavioral dependence - linked to automatic thoughts of reward - and psychological dependence - understood as an attempt to fill an existential emptiness (Carvalho, 2018).

Because it is a relatively new device, there is still a certain limitation regarding quantitative and qualitative data on the subject. Thus, the comparison between conventional and electronic cigarettes may underestimate the harmful effects of the latter, especially because the long-term effects are less known. However, studies have already demonstrated the potential damage at the micro and macroscopic level, such as changes characteristic of acute lung injury, including diffuse alveolar damage, acute fibrinous pneumonitis and organizing pneumonia, usually bronchiolocentric and accompanied by bronchiolitis (Butt et al., 2019). At the systemic level, increased respiratory symptoms have been evidenced in EC users, affecting nose, mouth, throat, and lower airways, chronic cough and hypersecretivity (in previous smokers who attempted transition or in young people who made experimental use), and exacerbation of asthma in patients with a previous diagnosis (Gotts et al., 2019; Winnicka & Shenoy, 2020; Wang et al., 2016). The study by Clarke et al. (2021) describes a carcinogenic effect of EC components, such as flavorings and additives, present in both nicotine-containing devices and those without (Bracken-Clarke et al., 2021).

In the analysis of the questionnaire responses, it was found that about half of the students had not received information about EVALI and more than half had no knowledge about the disease, despite its epidemiological importance, evidenced by an alarming 78% increase in EVALI cases among students in the United States from 2017 to 2018 (Winnicka & Shenoy, 2020). The students assessed had good understanding about the composition of EC, 70.2% stated the presence of carcinogenic substances (Bracken-Clarke et al., 2021).

Furthermore, as exposed by ROM, O., et al. (2014), in their review, abstinence rates from conventional cigarette smoking in individuals who adhered to EC for this purpose are considerably lower than those observed in studies examining commonly used and scientifically proven smoking cessation therapies (Rom et al., 2014). The use of evidence-based pharmacotherapy and nicotine patches, combined with counseling, a supportive environment, clear information, and community resources, are safe and effective in reducing cigarette dependence and are the only approach for which there is little uncertainty of therapeutic success (K. Michael Cummings et al., 2018).

The challenge is not limited to respiratory disease specialists. The increasing incidence of users by children and adolescents has also been a problem for pediatricians. Information about the risks and harms of this practice for young people and their parents remains a decisive strategy to be adopted (Chadi et al., 2019).

Despite the increase in the incidence of young users, however, international public policy is still a matter of controversy, leading to divergence between the different types of regulatory approaches by international pulmonology societies. In the United Kingdom, for example, EC use is considered a harm reduction policy, while in the United States and the European Union, the prevention approach has been more emphasized (Dockrell et al., 2013). The early approach to problematizing EC use appears to be insufficient in the academic health sciences. In the sample studied, about half of the participants in this study (48%) did not obtain any information about ECs during their activities in the medical course, either regarding their historical context, health harms, comparisons with conventional cigarettes, or any other topic involving them, and, of the 129 students who claimed to have received information about EC, only 20% considered it sufficient. Bhalerao et al, 2019 states that one of the great challenges in achieving this reduction is to prevent young people and non-smokers from having first contact with nicotine, and that, for this, numerous strategies can be used, with continuing and effective education being an important and underappreciated preventive strategy (Bhalerao et al., 2019).

5. Conclusion

The present study was able to achieve its objective of statistically explaining data about the use and knowledge about electronic cigarettes by medical students. Thus, the increase in the proportion of electronic cigarette users within the population of medical students, as well as the decrease in the aspects of assessing knowledge about the harmful effects of use, or else, lack

of knowledge about the pathological aspects reached statistically worrying numbers in comparison with previous literature.

Therefore, more studies are needed that can evaluate longitudinal and long-term comparative groups among the population of medical students who received correct guidance about electronic cigarettes and their pathological harm, comparing the proportion of electronic cigarette users with those who did not receive these guidelines appropriately, therefore being an analysis between populations of universities with different teaching programs on electronic cigarettes.

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