Awareness and prevention of the dangers of Electronic Smoking Devices (ESDs) among college students

https://doi.org/10.56238/sevened2024.012-043

Enrico Lopes Campos de Abreu[1], Ana Carolina Lopes Alves[2], Érico Arêdes de Oliveira Casagrande[3], Felipe Marques Lúcio Magalhães[4], Geovanna Brasil de Faria[5], Julia Ragone Vieira[6], Maria Fernanda Costa Russo Amorim[7], Matheus Silveira Guedes[8], Maria Manuella Vasconcelos Miranda Guzella[9], Nuno Hott Sena[10], Vitor Corrêa Machado Pereira[11] and Juscélio Clemente de Abreu[12]

ABSTRACT

Mistakenly understood as a less harmful alternative to health when compared to traditional cigarettes, the use of electronic smoking devices (ESDs), such as vape, has become popular among younger people as a modal alternative to regular cigarettes. Due to its recent popularization, data regarding its safety are still scarce, however, some studies have already proven that electronic cigarettes are more harmful to health when compared to the traditional one, demonstrating that there is a close relationship between the use of DEFs and the intensification of nicotine dependence and smoking, especially among university students, because they are in a transitional phase of life, which puts them in situations of emotional vulnerability, increasing the chances of exposure to smoking as a form of relief and social affirmation. Thus, the present study aimed to warn about the possible risks of using DEFs and their association with other drugs, as well as discussing the damage caused by the use of DEFs and their impacts on society, as a gateway to other drugs.

Keywords: Electronic smoking devices (ESDs), University and impacts on society.

[1] Graduating in Medicine
University Center of Caratinga - UNEC
[2] Graduating in Medicine
University Center of Caratinga - UNEC
[3] Graduating in Medicine
University Center of Caratinga - UNEC
[4] Graduating in Medicine
University Center of Caratinga - UNEC
[5] Graduating in Medicine
University Center of Caratinga - UNEC
[6] Graduating in Medicine
University Center of Caratinga - UNEC
[7] Graduating in Medicine
University Center of Caratinga – UNEC
[8] Graduating in Medicine
University Center of Caratinga - UNEC
[9] Graduating in Medicine
University Center of Caratinga - UNEC
[10] Graduating in Medicine
University Center of Caratinga - UNEC
[11] Graduating in Medicine
University Center of Caratinga – UNEC
[12] Doctor in Cytogenetics
University Center of Caratinga – UNEC

INTRODUCTION

Electronic cigarettes or electronic smoking devices (DEFs), also known as "vapes", are devices that have a nicotine vaporization system through a mechanism that produces aerosols from the combustion of a solvent-based liquid (vegetable glycerin, propylene glycol), flavorings, in addition to nicotine itself. Both conventional cigarettes and DEF are related to an increased risk of cancer and cardiovascular diseases (MAGALHÃES and ANDRADE, 2023).

DEFs were introduced to the global market in the early 2000s with the function of being a non-pharmacological adjunct for smoking cessation. Although the target audience was directed to nicotine users, over time similar products were launched that presented a more modern aesthetic compared to other electronic cigarettes, such as the so-called "pods" or "vapes", sold in a wide variety of colors, sizes and flavors, which made it possible for people who were not addicted to cigarettes to be open to experimenting and using. often, the novelty, being a success, especially among young people of school or university age (GÜLŞEN and USLU, 2020).

Currently, several studies demonstrate the harmful consequences of e-cigarettes, especially in relation to acute lung injury related to e-cigarette use (EVALI), which was first described in 2019, by radiographic and histological patterns consistent with acute to subacute lung injury, due to the severe consequence of vaporization (LIBER, 2021). One of the main risks of EVALI is the severity of the respiratory symptoms it causes, including cough, shortness of breath and chest pain, which can quickly progress to respiratory failure and consequently death.

According to Krishnasamy et al., (2020) e-cigarettes cause lung injury mainly associated with e-liquids containing tetrahydrocannabinol (THC) and other additives considered e-liquids. It has been seen by Fagan et al., (2018) and by Khlystov, Samburova (2016) apud Jason et al., (2023) that flavor additives in e-liquids have been associated with adverse effects on human lung endothelial cells. Exposure to these common additives resulted in reduced cell viability, increased apoptosis, and impaired tube formation and wound healing. The high expression of inflammatory cytokines provides a pro-inflammatory environment for endothelial cells exposed to these agents.

According to the resolution of the collegiate board - RDC No. 855, of April 23, 2024, the commercialization, importation and advertising of any electronic smoking devices throughout the Brazilian territory is prohibited (BRASIL, 2024). However, despite the prohibitions, according to studies by the Global Health Professional Students Survey (GHPSS) – or "Profile of smoking among university students in Brazil, PETUNI", which began in 2006, the percentage of university students who smoked some nicotine-based substance increased up to 24.4% in health courses (Inca, 2011).

From this perspective, the use of electronic cigarettes shows a gradual trend towards the practices of traditional cigarette use. In addition, through the analysis of scientific evidence, the studies showed statistical significance on the importance of smoking habits by students. Young

people in particular should reflect people's behavior patterns and demonstrate influence and power to change unhealthy patterns. However, evidence points to the high popularity of these devices worldwide, not only in academic contexts (BARROS et al., 2022).

Misinformation and the spread of e-cigarettes can fuel incidents. From this perspective, professional conduct can serve as a model for the population. It is essential to educate and sensitize students about the new trends of the century on the subject and, consequently, about the effects (SILVA, 2021).

This is justified by the fact that public policies for tobacco control require future physicians to be prepared for it, playing an important role in preventing smoking and promoting smoking cessation (BARROS et al., 2022). Allied to this, the best way to avoid this dependence is to guide young people, especially students, through orientation campaigns for traditional and electronic cigarettes. Combined with partnerships with agencies such as ANVISA (DIEHL et al., 2018).

DEVELOPMENT

In January 2018, a study conducted by the National Academies of Sciences, Engineering, and Medicine of the United States addressed the consequences of e-cigarette use. In the result it was observed that exposure of the lungs to various components of the e-cigarette aerosol can damage the respiratory system or worsen pre-existing lung diseases through a variety of mechanisms, for example, decreasing mucociliary clearance. In addition, the flavorings present in e-cigarettes have been associated with changes in the oxidation-reduction balance of cells in the airways, which may contribute to the increase of pro-inflammatory cytokines. In addition, the temperatures reached during the use of e-cigarettes can lead to the formation of toxic compounds, such as formaldehyde, which can exert harmful effects on the lung parenchyma (STRATTON et al., 2018)

RISKS OF USING DEFS

According to Marques (2021), although many scholars believe that the harmful effects of e-cigarettes are less intense than those caused by conventional cigarettes, there is numerous evidence relating their consumption to pathophysiological processes of aggression and inflammation of the respiratory epithelium. Propylene glycol, for example, has been linked to symptoms similar to those of upper respiratory infections. Its formation occurs through the hydration of propylene oxide, a possibly carcinogenic substance.

In addition, exposure to vegetable glycerin is related to effects such as irritation to the eyes, lungs, and esophagus. During the vaporization process, glycerol, one of the components, can turn into acrolein, a potent irritant to the skin, eyes, and nose, in addition to having carcinogenic potential (ELTORAI, CHOI, and ELTORAI, 2019).

Additional research has shown that the liquids and essences present in e-cigarettes contain a significant amount of heavy metals, including lead, nickel, and chromium, substances known to be associated with a higher risk of developing coronary and peripheral artery disease (OLIVEIRA et al., 2022).

PREVALENCE OF DEF USE

The increasing use of e-cigarettes among young people in recent years acts as an alarm, both for them and for society. However, the lack of regulation and quality control policies leaves the safety of these devices difficult to determine, and the potential health risk remains uncertain (OLIVEIRA et al, 2018).

In Brazil, there are few studies on knowledge about the use of electronic cigarettes. However, according to a study published in 2014 by the International Journal of Environmental Research and Public Health, 35% of Brazilians were already aware of DEFs and 3% reported having already used them. The data are on a par with countries such as Canada and China and are lower than those of countries such as the United States and Australia, which have knowledge of 73% and 66%, respectively, and experimentation of 15% and 20%, respectively (FONG *et al*, 2014).

In 2015, a study was conducted with students from the Federal University of Mato Grosso (Cuiabá Campus), in which a total of 489 people participated, 258 males and 231 females, with a mean age of 23.8 years for both sexes. The results of this research found that, among the participants, 5.7% were smokers and 4.9% were former smokers. As for DEFs, the prevalence of knowledge was 37%, being more known by male students (59%) than by female students (41%). In addition, it was found that the younger the student is, the greater the chance of getting to know the device. Finally, it was found that the rate of the then use of ESDs among students was 0.61%, but that the rate of experimentation was 2.7% and the rate of knowledge of the device was 7% (OLIVEIRA *et al*, 2015).

More recently, in 2019, data from the National School Health Survey (PeNSE) – conducted by the Brazilian Institute of Geography and Statistics (IBGE) – were collected between 2015 and 2019, to establish knowledge about the use of cigarettes and similar products among young people aged 13 to 17 years. The results showed that 22.6% of the students had already tried cigarettes at some point and that the use of hookahs, e-cigarettes or similar products was already done by 26.9%, being higher among male students aged 16 and 17 years at the time (MALTA *et al.,* 2022).

In view of the data presented, the importance of a study on the use of ESDs or electronic cigarettes and similar among current young people is reinforced, as they function as a current health problem with long-term data consequences, which can overload the Brazilian Health System.

RISKS OF OTHER DRUGS

DEFs, or electronic cigarettes, were the most reported device in all DOTN classes, which are discrete devices for the consumption of drugs other than nicotine. Among them, cannabinoids were the most present class of DOTN. However, the presence of other illicit drugs, such as amphetamines, kratom, vitamins, opiates, DMT, fentanyl and ketamine was also found. Such data is important for a substance use-focused intervention that includes vaping, raising awareness of DOTN e-cigarette use, and highlighting public safety issues in driving impairments, crime scene investigations, and death investigations. (HOLT et al., 2023).

The increase in the frequency of DEF use is significantly related to the increase in the use of other substances experienced by young people. This fact is of great importance for the prevention of drug abuse and dependence. The positive relationship between the degree of use of DEFs and the tendency to experiment with other substances supports the hypothesis that nicotine dependence may increase the susceptibility of young people to experimenting with other drugs. Whereas neurobiology studies on frequent nicotine use and addiction indicate that nicotine primes the brain for increased likelihood of illicit drug experimentation and increases the risk of addiction and abuse. (ANDREW et al., 2021).

FINAL CONSIDERATIONS

The problem of the theme becomes relevant to the extent that the growth in the use of electronic cigarettes among young people becomes harmful to them, since, at the same time, the imbroglio of frequent lung lesions arises, especially the disease EVALI, which refers to the damage caused by the substances of electronic cigarettes in the body of their consumers.

Therefore, there is a need for more discussions on the subject so that the dispersion of this veiled knowledge about the problem promotes awareness among the intended public.

There is a significant gap in data collection, with information often inaccurate, despite the fact that most young people are aware of the risks associated with severe lung diseases. This phenomenon is exacerbated by the intense advertising promoted by e-cigarette manufacturers, which use strategies to encourage the consumption of these devices.

It is essential to implement interventions that promote healthy habits among students and discourage the use of e-cigarettes, with the aim of preventing the increased consumption of other products that also release inhaled nicotine, including tobacco products.

There is a need for in-depth investigation into the consequences of e-cigarette use, the constituents of e-liquids, the characteristics of users, and usage patterns. To this end, it is necessary to carry out surveys of prevalence data on the use of electronic cigarettes, in order to consolidate relevant information and enable effective interventions.

Detailed epidemiological studies are crucial to understand the extent of the problem and to formulate evidence-based public policies aimed at reducing the use of these devices among young people. Additionally, it is imperative to examine the long-term health impacts, the mechanisms by which e-liquids affect the respiratory system, and the marketing strategies used by businesses to target this demographic. More research is needed focusing on their consequences, the constituents of e-liquids, user characteristics and usage patterns.

E-cigarettes, originally intended to be used as cigarette substitutes, have evolved into discrete devices for the consumption of drugs other than nicotine (DOTNs). Cannabinoids were the most reported class of DOTN, both for lifetime use and in the past 30 days. Other reported DOTNs included herbal supplements, amphetamines, caffeine, kratom, vitamins, opiates, DMT, fentanyl, and ketamine. (HOLT et al., 2023).

Thus, the current ease of consuming illicit drugs through electronic cigarettes is worrisome, mainly due to their popularization in the social context of adolescents and young adults. Neurobiology studies on nicotine occurrence and addiction indicate that nicotine primes the brain for a higher likelihood of illicit drug experimentation and increases the risk of addiction.

Young people, whose brains are still developing, may experience greater and longer-lasting neurobiological changes after addiction or even mere exposure to nicotine. (ANDREW et al., 2021). Therefore, it is worth emphasizing the great risk of early exposure to nicotine to influence the use of illicit drugs and substance abuse.

REFERENCES

1. Barros, G. V. N. do R. et al. (2022). Conhecimento e perspectivas acerca do cigarro eletrônico de estudantes de medicina de uma faculdade privada no Recife.

2. Brasil. (2013). Resolução nº 466, de 12 de dezembro de 2012. Dispõe sobre diretrizes e normas regulamentadoras de pesquisas envolvendo seres humanos. Diário Oficial [da] República Federativa do Brasil, Brasília, DF, 13 jun. Disponível em: http://bit.ly/1mTMIS3. Acesso em: 25 de maio de 2024.

3. Diehl, A., Cordeiro, D., & Laranjeira, R. (2018). *Dependência química: prevenção, tratamento e políticas públicas*. Artmed Editora.

4. Klein, T. A. S. et al. (2021). Hábito de tabagismo entre adolescentes de escolas brasileiras. *Revista Sustinere*, 9, 509-531.

5. Martins, S. R. et al. (2017). Effective tobacco control measures: agreement among medical students. *Jornal Brasileiro de Pneumologia*, 43, 202-207.

6. Oliveira, W. J. C. et al. (2018). Conhecimento e uso do cigarro eletrônico entre estudantes da Universidade Federal de Mato Grosso. *Jornal Brasileiro de Pneumologia*, 44, 367-369.

7. Silva, A. P., & Pachú, C. O. (2021). O uso de cigarros eletrônicos no Brasil: uma revisão integrativa. *Research, Society and Development*, 10(16), e216101623731-e216101623731.

8. Lima, P. V. de M., Maia, P. B., & Duarte, J. de J. L. (2023). Prevalence of electronic cigarette use and its respiratory complications among medical students at a private university in Teresina-PI. *Research, Society and Development*, 12(4).

9. Magalhães, M. B., & Andrade, L. G. (2023). Os possíveis riscos à saúde causados pelo uso de cigarros eletrônicos por jovens. *Revista Ibero-Americana de Humanidades, Ciências e Educação*, 9(5), 3463-3480.

10. Liber, A. C. et al. (2021). The EVALI outbreak and tobacco sales in the USA, 2014–2020. *Tobacco Control*, 15 dez.

11. Holt, A. K., Rudy, A. K., Sawyer, A. N., Poklis, J. L., Breland, A. B., & Peace, M. R. (2023). Pesquisa com residentes nos EUA e seu uso de cigarros eletrônicos com outras drogas além da nicotina. *Jornal de Drogas Psicoativas*, 1–10.

12. Simkus, A., Holtz, K. D., Twombly, E. C., & Wanty, N. I. (2021). How Degrees of Vape Use Relate to Illicit Substance Use by Youth Aged 13 To 17 In The United States. *J Addict Res*, 5(2), 119-120.

13. National Academies of Sciences, Engineering, and Medicine. (2018). *Public health consequences of e-cigarettes*. Washington, DC: The National Academies Press. DOI: 10.17226/24952.

14. Eltorai, A. E. M., Choi, A. R., & Eltorai, A. S. (2019). Impact of electronic cigarettes on various organ systems. *Respiratory Care*, 64(3), 328-336.

15. Oliveira, V. H. et al. (2022). O uso de cigarro eletrônico por jovens e efeitos adversos ao sistema cardiovascular. *Research, Society and Development*, 11(4).