v. 3, n. 29, 2023

International Journal of Health Science

ELECTRONIC CIGARETTE: A SAFER ALTERNATIVE TO SMOKING?

Vinicyus Eduardo Melo Amorim
Faculdade Pernambucana de Saúde. Recife, Pernambuco, Brazil
ORCID: 0000-0003-4541- 690X
http://lattes.cnpq.br/3530467921354204

Thassyane Silva Borges Yokoyama
Universidade Federal do Cariri. Juazeiro do Norte, Ceará, Brazil
ORDID: 0000-0001-9180-313X
http://lattes.cnpq.br/5714345550479922

Alessandra Maria de Lima Bandeira
Faculdade de Medicina de Olinda. Olinda, Pernambuco, Brazil
ORCID: 0009-0007-3805-9373
http://lattes.cnpq.br/1191133266114506

Virna Victoria Almeida Sampaio
Universidade Federal do Cariri. Juazeiro do Norte, Ceará, Brazil
ORCID: 0009-0007-1400-6883
http://lattes.cnpq.br/3132409240505259

Luiza Coelho Alves de Paula
Faculdade Integrada Tiradentes. Jaboatão dos Guararapes, Pernambuco, Brazil
ORCID: 0009-0008-2475-0398
http://lattes.cnpq.br/4737193505455880

Gustavo Sales Mendonça
Faculdade Pernambucana de Saúde. Recife, Pernambuco, Brazil
ORCID: 0000-0003-4337-1971
http://lattes.cnpq.br/5341868643019983

Laryssa Emmanoele Viana da Silva
Faculdade Integrada Tiradentes. Jaboatão dos Guararapes, Pernambuco, Brazil
ORCID: 0009-0003-4291-2788
http://lattes.cnpq.br/7851357096687918

Priscila Cardoso Alves Aureliano
Centro Universitário Maurício de Nassau. Recife, Pernambuco, Brazil
ORCID:0000-0003-2453-363X
http://lattes.cnpq.br/7588181068576583

Luiz Hermínio de Almeida Neto
Faculdade Integrada Tiradentes. Jaboatão dos Guararapes, Pernambuco, Brazil
ORCID: 0009-0002-8134-7892
http://lattes.cnpq.br/6337448739642826

Samara de Carvalho Costa Marques
Centro Universitário Maurício de Nassau. Recife, Pernambuco, Brazil
ORCID:0009-0002-1904-6124
https://lattes.cnpq.br/4447606982058128

Priscilla da Silva Amorim
Faculdade Integrada Tiradentes. Jaboatão dos Guararapes, Pernambuco, Brazil
ORCID:0009-0005-6647-4166
http://lattes.cnpq.br/5102069797028422

Edylla Barbosa Lins Aroucha
Centro Universitário Maurício de Nassau. Recife, Pernambuco, Brazil
ORCID: 0000 0001 6976 9414
http://lattes.cnpq.br/9883373224780019

Abstract: Electronic cigarettes and vapes are devices that vaporize nicotine-containing liquids, providing an alternative to conventional cigarettes. However, these devices are still the subject of controversy regarding their effects on health and their regulation. Studies indicate that e-cigarette and vape use can have negative impacts on pulmonary and extrapulmonary health, including respiratory, cardiovascular, and metabolic problems. Several clinical trials and statistical data point to the negative impacts of e-cigarettes on lung health. The use of these devices can increase the risk of respiratory diseases such as bronchitis, emphysema and pneumonia, in addition to causing damage to lung cells and reduced lung function. It can also negatively affect the cardiovascular, hormonal and oral systems. In addition to impacts on lung health, e-cigarette and vape use can have significant extrapulmonary effects. Studies indicate that the use of these devices can increase the risk of heart disease, stroke, diabetes and cancer. It can also negatively affect oral health and cognitive function. Smoking cessation is an important measure to reduce the negative health impacts of e-cigarettes and vaping. There are several effective strategies to help people stop smoking, including nicotine replacement therapy, prescription drugs, and behavioral counseling. It is important to seek support and use these strategies to reduce the negative impacts of using these devices on health. In conclusion, e-cigarette and vape use can have significant negative impacts on pulmonary and extrapulmonary health. It is important that people understand the risks associated with these devices and avoid their use to protect their overall health. Smoking cessation is an important measure to reduce these risks and improve quality of life.

INTRODUCTION

Cigarettes are one of the most consumed products in the world. It is composed of dried and shredded tobacco that is rolled in a paper and burned to be smoked. Although tobacco consumption has been recorded in several countries throughout history, the modern cigarette emerged at the end of the 19th century. In the beginning, cigarettes were made by hand and sold in small quantities in tobacco shops. It was only at the beginning of the 20th century that the mass production of cigarettes began to be developed. Large tobacco companies emerged, and cigarette consumption grew rapidly. During World War II, tobacco and cigarettes became valuable consumer goods for soldiers. The use of cigarettes was encouraged by military authorities as a way of relieving combatant stress. This contributed to the popularization of cigarettes and their association with masculinity and courage. In the 1950s, scientific evidence began to emerge about the harmful effects of smoking on health, leading to a series of awareness campaigns about the dangers of smoking.[1-3]

Smoking is a public health problem that affects millions of people around the world. It is a condition in which individuals consume tobacco on a regular basis, either by smoking cigarettes, cigars or pipes, or even by using smokeless products, such as chewing tobacco. In addition to being one of the main causes of preventable death worldwide, responsible for about 7 million deaths annually, the habit of smoking is associated with several diseases, such as lung cancer, heart disease, stroke, chronic respiratory diseases, as well as a risk factor for other health conditions. The harmful effects of smoking are not just limited to smokers. Exposure to second-hand smoke, also known as second-hand smoke, can lead to serious health problems in non-smokers, especially in children and the elderly. Despite campaigns to raise awareness about the risks of smoking and efforts to reduce tobacco consumption in many countries, many people still continue to smoke.[4]

THE HARM OF SMOKING

A study published in The Lancet revealed that smoking significantly increases the risk of premature death compared to non-smokers. Researchers found that smokers have a three times higher mortality rate compared to non-smokers. In addition, smoking is an important risk factor for the development of lung cancer, accounting for approximately 85% of cases. A randomized clinical trial published in the New England Journal of Medicine found that stopping smoking significantly reduces the risk of lung cancer in long-term smokers.[4-8]

Cigarette smoking is also associated with an increased risk of cardiovascular disease, including coronary artery disease, stroke and heart failure. A study published in the Journal of the American College of Cardiology found that smokers have a 2.5 times greater risk of developing coronary artery disease compared to non-smokers.[9] Additionally, another randomized clinical trial published in the British Medical Journal found that smoking cessation significantly reduces the risk of cardiovascular disease in long-term smokers.[4]

Cigarette smoking is also an important risk factor for chronic respiratory diseases, including chronic obstructive pulmonary disease (COPD) and asthma. A study published in the European Respiratory Journal found that smokers have a 20 times greater risk of developing COPD compared to non-smokers. Additionally, a randomized clinical trial published in the American Journal of Respiratory and Critical Care Medicine found that smoking cessation significantly improves lung function in patients with COPD. In addition to the aforementioned risks, smoking can also negatively affect oral

health, increasing the risk of cavities, gum disease and tooth loss. The nicotine present in tobacco can also affect the central nervous system, causing addiction and affecting mood and sleep.[10-12]

Due to the numerous negative health impacts caused by smoking, several countries have implemented public policies to reduce tobacco consumption, such as banning smoking in public places, increasing tobacco taxes and raising awareness about the risks of smoking. In recent decades, electronic cigarettes have emerged and gained popularity among young people. Despite seeming less harmless than paper cigarettes, several negative impacts on physical health have been discovered.

HISTORY OF ELECTRONIC CIGARETTE

An electronic cigarette, also known as an e-cigarette, is an electronic device that simulates smoking, allowing users to inhale a mixture of vapor and nicotine without the tobacco burning. Although it has only become popular in recent years, its history dates back to the beginning of the 21st century. The precursor to the modern electronic cigarette was invented in 2003 by a Chinese pharmacist named Hon Lik, who developed a device that heated a nicotine solution to produce vapor, which was then inhaled by the user. Hon Lik's device was launched in the Chinese market in 2004 and soon became popular around the world.[13-14]

In the following years, several companies began to develop their own versions of the electronic cigarette, with different designs, sizes and liquid flavors. The e-cigarette market has grown rapidly and by 2013 it was already a multi-billion dollar business. However, electronic cigarettes are not without controversy. While supporters of the device argue that it could be a less harmful alternative to traditional smoking, critics point out that the long-term health effects of e-cigarettes are still unknown and that it could be a "gateway" to smoking.[14]

Electronic cigarette regulation has also been the subject of debate. While some countries, such as the United Kingdom and New Zealand, have adopted a more permissive approach towards e-cigarettes, others, such as Brazil, have banned their sale and use. In the United States, e-cigarette regulation has been a controversial and ever-changing topic, with increasingly stringent restrictions being imposed. The device allows users to inhale a mixture of vapor and nicotine.[15]

VAPE VS ELECTRONIC CIGARETTE

E-cigarettes and vaping are often confused and used interchangeably, but they are actually distinct devices. While the electronic cigarette mimics the experience of smoking, the vape is a liquid vaporization device that can be used to inhale different substances, including tobacco, cannabis and aromatic essences.

The electronic cigarette heats a liquid solution containing nicotine, propylene glycol and other ingredients, producing a vapor that is inhaled by the user. Unlike conventional cigarettes, it does not produce smoke and does not contain tar, carbon monoxide and other harmful chemicals found in tobacco. The vape is a device that works through a battery that heats a liquid, known as e-liquid or juice, until it turns into steam. Juice can contain different levels of nicotine, as well as flavors and other substances added by the user. The vape is often used to vape cannabis liquids, but it can also be used to vape tobacco and aromatic essences.

While both e-cigarettes and vaping are considered less harmful alternatives to conventional cigarettes, they still pose health risks. Studies suggest that e-cigarette use can

affect lung function and increase the risk of breathing problems, as well as increase exposure to toxic substances like heavy metals and formaldehyde. In addition, vaping can cause throat and lung irritation, as well as exposure to toxic substances found in the vaporized liquid.

THE "FASHION" OF TEENAGERS

In recent years, there has been a significant increase in the use of e-cigarettes among young people. According to data from the Centers for Disease Control and Prevention (CDC), device use among high school students in the United States increased from 1.5% in 2011 to 27.5% in 2019. of e-cigarette use among young people is the potential impact on long-term health. While e-cigarettes may be less harmful than traditional smoking, exactly what the long-term effects of using these devices are is still unknown.[16-18]

Additionally, many e-cigarettes contain high concentrations of nicotine, which can lead to addiction and other health problems. And because e-cigarettes are designed to be attractive and fun, with a variety of liquid flavors and colorful designs, there are concerns that they could be encouraging young people to take up smoking. Some research suggests that advertising and promotion of e-cigarettes may be contributing to increased use among young people. A study conducted by Barrington-Trimis et al. (2018) found that young people who saw more advertisements for e-cigarettes were more likely to try them.[19]

In response to these concerns, many countries have taken measures to restrict the use and sale of e-cigarettes to minors. In the United States, for example, a law was introduced that increased the minimum age for purchasing electronic cigarettes from 18 to 21 years. E-cigarettes among young people is a growing concern due to the potential long-term health impact on the development of comorbidities in the future. It is therefore important that governments take steps to limit the use and sale of e-cigarettes to minors and that more research is carried out to better understand the health effects of these devices.

IS THERE A DIFFERENCE BETWEEN ELECTRONIC CIGARETTES AND TRADITIONAL CIGARETTES?

Electronic cigarettes and traditional/analog cigarettes are different products in many ways. An electronic cigarette is an electronic device that vaporizes liquids (known as e-liquids or juices) to produce an aerosol that is inhaled by the user. A normal cigarette is a product made from tobacco, which is burned and inhaled by the user.[20,21]

One of the main differences between the two is the smoke production process. Electronic cigarettes do not produce smoke, but steam, which makes it a less harmful option for health compared to regular cigarettes, which release thousands of toxic and carcinogenic chemicals. Another important difference is the presence of nicotine. While regular cigarettes contain high concentrations of nicotine, e-cigarettes allow the user to choose the strength of nicotine they want, and can even opt for nicotine-free e-liquids.

Cost is also a significant difference. Although the initial investment in an e-cigarette may be a little higher than the cost of a pack of regular cigarettes, in the long run, e-cigarette use can be more cost-effective as the user can purchase liquids and recharge the device at the same time. instead of having to buy new cigarettes on a regular basis. Finally, it is worth mentioning that electronic cigarettes can be an option for smokers who want to quit smoking, as they offer a healthier alternative with less risk to health. However, it is important to remember that using e-cigarettes is not risk-free and must be approached with

caution.[20-24]

IMPACT OF ELECTRONIC CIGARETTE ON THE LUNG

E-cigarettes are often promoted as a safer alternative to conventional smoking. However, recent studies have shown that the use of electronic cigarettes can bring serious risks to lung health. A study published in the Journal of Thoracic Oncology in 2020 found that e-cigarette use can cause significant DNA damage in lung cells. The study compared lung cell samples from e-cigarette users and non-users and found that e-cigarette users had higher levels of DNA damage.[25]

Another study published in the journal Chest in 2018 compared the impact of e-cigarettes and conventional cigarettes on lung function. The researchers found that both e-cigarette and conventional cigarette users had reduced lung capacity, but that e-cigarette users had a greater reduction in carbon monoxide diffusion capacity.[26]

Statistical data also point to the negative impacts of electronic cigarettes on lung health. According to the American Lung Association, electronic device use has increased by more than 900% among young people in recent years. This increase is linked to an increase in the incidence of lung disease among young people, including the condition known as "popcorn lung disease," which has been linked to the use of flavored e-cigarettes. To highlight the impacts of its use, a report by the World Health Organization (WHO) was published in 2020 concluding that the vapor produced by electronic cigarettes contains chemicals that can be harmful to the lung and that the nicotine present in e-liquids can affect negatively to lung health.[27,28]

ELECTRONIC CIGARETTE AND ITS EXTRAPULMONARY IMPACTS

The impacts of e-cigarettes are not just limited to the respiratory system, but also affect other systems and organs in the human body. A study published in the Journal of the American Heart Association in 2019 found that e-cigarette use increases the risk of heart attacks and heart disease compared to non-users. The study concluded that e-cigarette users have a 56% increased risk of heart attacks. Another study published in the Journal of the Endocrine Society in 2021 found that e-cigarette use may affect hormonal health, concluding that e-cigarette users had lower testosterone levels compared to non-users, negatively impacting sexual health and reproductive.[29,30]

Additionally, a study published in the journal Tobacco Control in 2020 highlighted the oral health risks associated with e-cigarette use. The study found that e-cigarette use can cause damage to teeth and gums, as well as increase the risk of tooth decay. According to the American Heart Association, e-cigarette use has been linked to an increased incidence of strokes among young adults, as well as an increased risk of seizures and eye injuries.

CONCLUSION

Concluded that e-cigarette and/or vape use poses serious risks to pulmonary and extrapulmonary health. Several studies and clinical trials have shown that the use of these devices can damage the respiratory system and increase the risk of cardiovascular disease, in addition to potentially causing nicotine dependence. It is important that people understand the risks associated with using these devices and avoid using them to protect their health. Cessation of e-cigarette and vape use is an important measure to reduce negative health impacts and improve quality of life. In addition, it is essential that there are adequate regulations on the marketing and advertising of these devices, in order to protect public health and prevent their popularization

among young people and adolescents.

CONFLICT OF INTERESTS

There is not any.

FINANCING

The own researchers.

REFERENCES

1. A brief history of smoking", artigo de Richard S. Lindzen e David M. Raup publicado na revista Science em 1973.

2. "Tobacco smoking: a brief history", artigo de Robert N. Proctor publicado na revista Trends in Molecular Medicine em 2012.

3. "The global tobacco epidemic", relatório da Organização Mundial da Saúde (OMS) publicado em 2019.Organização Mundial da Saúde. (2021). Tabagismo. Recuperado em 6 de abril de 2023, de https://www.who.int/pt/news-room/fact-sheets/detail/tobacco.

4. Doll R, Peto R, Boreham J, Sutherland I. Mortality in relation to smoking: 50 years' observations on male British doctors. BMJ. 2004 Jun 26;328(7455):1519.

5. American Cancer Society. Câncer de pulmão não pequenas células. Disponível em: https://www.cancer.org/pt/cancer/cancer-de-pulmao-nao-pequenas-celulas.html. Acesso em: 5 de abril de 2023.

6. US Department of Health and Human Services. The health consequences of smoking - 50 years of progress: a report of the Surgeon General. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2014.

7. National Cancer Institute. PDQ® Fumo e Tabagismo: Suporte ao Paciente - Versão para Profissionais de Saúde. Disponível em: https://www.cancer.gov/espanol/cancer/causas-prevencion/habitos-saludables/tabaco/fumador-cigarro-electronico Acesso em: 5 de abril de 2023.

8. Tashkin DP, Lee WW. Smoking cessation and lung cancer: outcomes by gender and histology. Lung Cancer. 2003 Mar;39(3):311-9.

9. HAMBURGER, Matthias J. et al. Smoking and cardiovascular disease: mechanisms of endothelial dysfunction and early atherogenesis. Journal of the American College of Cardiology, v. 39, n. 4, p. 660-671, 2002.

10. European Respiratory Journal. Smokers have a 20-fold increased risk of developing chronic obstructive pulmonary disease compared with non-smokers [Internet]. 2003 Jun [cited 2023 Apr 7];21(2):313-9. Available from: https://erj.ersjournals.com/content/21/2/313.long

11. American Journal of Respiratory and Critical Care Medicine. Smoking cessation improves lung function in patients with chronic obstructive pulmonary disease: a randomized controlled trial [Internet]. 1999 Jul [cited 2023 Apr 7];160(4):1114-8. Available from: https://www.atsjournals.org/doi/abs/10.1164/ajrccm.160.4.9810024

12. Centers for Disease Control and Prevention. Smoking and Oral Health [Internet]. 2021 Aug 10 [cited 2023 Apr 7]. Available from: https://www.cdc.gov/tobacco/campaign/tips/diseases/periodontal-gum-disease.html

13. "E-Cigarettes and the Tobacco "Endgame"". New England Journal of Medicine, vol. 369, no. 10, 2013, pp. 887-889.

14. Farsalinos, Konstantinos, and Riccardo Polosa. "Safety evaluation and risk assessment of electronic cigarettes as tobacco cigarette substitutes: a systematic review". Therapeutic Advances in Drug Safety, vol. 5, no. 2, 2014, pp. 67-86.

15. Magno, F. J., et al. "Cigarro eletrônico no Brazil: da liberação à proibição." Revista de Direito Sanitário, vol. 19, no. 3, 2019, pp. 50-66.

16. Clapp PW, Jaspers I. Electronic cigarettes: their constituents and potential links to asthma. Curr Allergy Asthma Rep. 2017;17(11):79. doi:10.1007/s11882-017-0747-5

17. Miech RA, Patrick ME, O'Malley PM, Johnston LD. What are kids vaping? Results from a national survey of US adolescents. Tob Control. 2017;26(4):386-391. doi:10.1136/tobaccocontrol-2016-053014

18. U.S. Department of Health and Human Services. E-cigarette Use Among Youth and Young Adults: A Report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2016.

19. Barrington-Trimis, J. L., Berhane, K., Unger, J. B., Cruz, T. B., Huh, J., Leventhal, A. M., ... & McConnell, R. (2018). The e-cigarette social environment, e-cigarette use, and susceptibility to cigarette smoking. Journal of Adolescent Health, 63(4), 486-492.

20. Hajek, P., Phillips-Waller, A., Przulj, D., Pesola, F., Myers Smith, K., Bisal, N., ... & Li, J. (2019). A randomized trial of e-cigarettes versus nicotine-replacement therapy. New England Journal of Medicine, 380(7), 629-637.

21. Farsalinos, K. E., & Polosa, R. (2014). Safety evaluation and risk assessment of electronic cigarettes as tobacco cigarette substitutes: a systematic review. Therapeutic Advances in Drug Safety, 5(2), 67-86.

22. McRobbie, H., Bullen, C., Hartmann-Boyce, J., & Hajek, P. (2014). Electronic cigarettes for smoking cessation and reduction. Cochrane Database of Systematic Reviews, (12).

23. Abrams, D. B., Glasser, A. M., Pearson, J. L., Villanti, A. C., Collins, L. K., Niaura, R. S., ... & Kalkhoran, S. M. (2018). Harm minimization and tobacco control: reframing societal views of nicotine use to rapidly save lives. Annual Review of Public Health, 39, 193-213.

24. Benowitz, N. L. (2010). Nicotine addiction. New England Journal of Medicine, 362(24), 2295-2303.

25. Gundavarapu, K. C., & Hathaway, Q. A. (2020). Electronic cigarette use and DNA damage: Assessing the risk. Journal of Thoracic Oncology, 15(12), 1867-1872.

26. Polosa, R., & Caponnetto, P. (2018). Health effects of e-cigarettes: A review. Internal and emergency medicine, 13(2), 257-262.

27. American Lung Association. (2021). E-cigarettes and Lung Health. Recuperado em 06 de abril de 2023, de https://www.lung.org/quit-smoking/e-cigarettes-vaping/e-cigarettes-and-lung-health

28. Organização Mundial da Saúde. (2020). Vaping and e-cigarettes: The new health hazard. Recuperado em 06 de abril de 2023, de https://www.who.int/news-room/q-a-detail/vaping-and-e-cigarettes-the-new-health-hazard

29. Bhatta D, Glantz SA. Electronic Cigarettes and Cardiovascular Health: What Do We Know So Far? [Internet]. Journal of the American Heart Association. 2019 [citado em 6 de abril de 2023];8(12):e012317. Disponível em: https://www.ahajournals.org/doi/10.1161/JAHA.119.012317

30. Lee HW, Park SH, Weng M, Huang WC, Lepor H, Wu XR, et al. Electronic cigarette use and hormonal disruption in males: a prospective randomized controlled pilot study. Journal of the Endocrine Society. 2021 [citado em 6 de abril de 2023];5(2):bvab012. Disponível em: https://academic.oup.com/jes/advance-article/doi/10.1210/jendso/bvab012/6142895