

The impact of electronic cigarettes on human health

Petra Fol'varská

Gymnázium, Konštantínova 2, Prešov, Slovakia



Abstract

This article presents the results of a survey focused on the use of electronic cigarettes and public awareness of their health effects. The findings show that although electronic cigarettes are often perceived as a safer alternative to traditional smoking, awareness of their risks remains insufficient, especially among young people. *Social influence and curiosity* were identified as the main reasons for use, while quitting smoking was less common. The results highlight the need for *better education and preventive measures* aimed at adolescents.

Keywords: electronic cigarette; health impact; addiction; public awareness; reasons for use; adolescents

1 Introduction

Electronic cigarettes, also known as vapes, have become increasingly popular, particularly among young people. They are often promoted as a less harmful alternative to traditional tobacco cigarettes. However, their real impact on human health is still being debated (World Health Organization [WHO], 2023).

Unlike traditional cigarettes, electronic cigarettes do not burn tobacco but heat a liquid (e-liquid) that is inhaled as an aerosol. This liquid may contain nicotine, flavourings, and various chemical substances. Although they do not produce tar, they still expose users to potentially harmful substances, including those affecting the respiratory and cardiovascular systems (WHO, 2023).

Nicotine is highly addictive and can negatively affect brain development, especially in adolescents. Specifically, nicotine can disrupt the formation of brain circuits that manage attention, learning, and susceptibility to addiction. Several studies suggest that adults who smoked in their youth are seven times more likely to be addicted to nicotine. Furthermore, nicotine can intensify symptoms of depression and anxiety (Truth Initiative, 2022).

Even nicotine-free electronic cigarettes may cause **irritation and inflammation** due to chemical components such as acetylpropionyl, acetoin, and diacetyl. Concentrations of diacetyl have exceeded laboratory limits, and when inhaled, it can cause serious respiratory illnesses. Specific flavours contain harmful chemicals; for example, cinnamaldehyde is found in cinnamon flavouring and has toxic effects on white blood cells. Other chemicals, such as o-vanillin and pentanedione, are found in vanilla and honey flavourings and may

cause cellular toxicity. These effects have also been discussed by Ascendant New York (n.d.). In addition, although nicotine-free electronic cigarettes should not contain nicotine, some of them do (The Guardian, 2023).

The aim of this article is to **analyse public awareness and behaviour** related to electronic cigarettes based on empirical research.

2 Literature review

Electronic cigarettes have become one of the most discussed public health topics over the last decade. Although they were originally introduced as a potentially less harmful alternative to conventional tobacco cigarettes, recent research suggests that they are not without health risks.

According to the World Health Organization (WHO, 2023), electronic cigarettes expose users to nicotine and numerous potentially harmful substances despite producing fewer toxic compounds than conventional cigarettes. The WHO emphasizes that there is currently insufficient evidence to consider electronic cigarettes safe, particularly for adolescents, pregnant women, and non-smokers.

Similarly, the Centers for Disease Control and Prevention (CDC, 2024) reports that aerosols generated by electronic cigarettes contain harmful chemicals, including heavy metals, volatile organic compounds, ultrafine particles, and flavouring substances associated with respiratory diseases. The CDC also highlights that electronic cigarette use has been linked to serious lung injuries and recommends avoiding their use, especially among young people.

Research consistently shows that nicotine is one of the greatest concerns associated with electronic cigarette usage. According to the National Institute on Drug Abuse (NIDA, 2024), nicotine exposure during adolescence may interfere with normal brain development, negatively affecting learning, memory, attention, and impulse control while increasing the likelihood of long-term addiction.

Previous studies have also demonstrated that nicotine-free electronic cigarettes cannot be considered completely safe. Behar et al. (2016) detected harmful flavouring chemicals such as diacetyl and acetyl propionyl in many commercially available e-liquids. Likewise, Clapp et al. (2017) reported that several flavouring compounds may induce inflammatory and oxidative responses in lung cells, suggesting that health risks remain even in the absence of nicotine.

The long-term health consequences of electronic cigarette usage are still being investigated. The National Academies of Sciences, Engineering, and Medicine (2018) concluded that electronic cigarettes generally expose users to fewer toxic substances than combustible cigarettes; however, sufficient evidence indicates adverse effects on the respiratory and cardiovascular systems. The report also stresses that additional long-term research is needed before firm conclusions regarding overall safety can be made.

Another important finding concerns the growing popularity of electronic cigarettes among adolescents. The CDC (2024) and WHO (2023) identify flavoured products, social influence, curiosity, and aggressive marketing strategies as major factors contributing to the increasing use of electronic cigarettes among young people. These findings are particularly relevant because adolescence represents the period during which nicotine addiction develops most easily.

Overall, previous research consistently suggests that although electronic cigarettes may reduce exposure to some toxic substances compared with conventional cigarettes, they

are not harmless. Existing evidence indicates potential risks to respiratory health, cardiovascular function, and adolescent brain development while highlighting the need for further research, public education, and effective prevention strategies.

3 Methodology

To better understand the use of electronic cigarettes and public perception, a quantitative questionnaire survey was conducted. The anonymous questionnaire was designed by the author based on the objectives of the study and findings from the reviewed literature. It aimed to explore public attitudes towards electronic cigarettes rather than respondents' technical knowledge of these products. The survey was distributed online through social media and with the assistance of teachers and colleagues, reaching **261 respondents from different age groups**.

The questionnaire focused on:

- the use of electronic cigarettes;
- frequency and duration of use;
- reasons for use;
- awareness of health risks;
- opinions on addiction and smoking cessation.

The collected data were analysed using descriptive statistics and presented in the form of frequencies, percentages, tables, and graphs. One limitation of the study is that not every respondent answered every question, resulting in slight differences in the number of responses for individual items.

4 Results and Discussion

The survey results provide several insights into the use and public perception of electronic cigarettes. Of the 261 respondents, 60 reported having used electronic cigarettes, while 201 had never used them. Among users, half reported regular use, while the others used them occasionally.

The most common reasons for using electronic cigarettes were **social influence and curiosity**. These findings are consistent with previous research identifying social factors, curiosity, and flavoured products as important factors influencing electronic cigarette use among young people (CDC, 2024; WHO, 2023).

Most users preferred nicotine-containing and flavoured products. This corresponds with previous research highlighting the addictive nature of nicotine and the potential health effects of flavouring chemicals (NIDA, 2024).

Interestingly, quitting smoking was one of the least common reasons for using electronic cigarettes. This suggests that, among our respondents, vaping was more often associated with curiosity or social influence than with smoking cessation.

Most respondents also believed that society is insufficiently informed about the health risks of electronic cigarettes, particularly adolescents. This finding is consistent with concerns expressed by the WHO (2023) and CDC (2024) regarding young people's vulnerability to nicotine exposure.

Opinions about the harmfulness of electronic cigarettes were divided. While some respondents considered them less harmful than conventional cigarettes, others considered them equally or almost equally harmful. This reflects existing research showing

that e-cigarettes may expose users to fewer toxic substances than conventional cigarettes but cannot be considered harmless (National Academies of Sciences, Engineering, and Medicine, 2018; WHO, 2023).

Overall, the findings of this study are broadly consistent with previous research, particularly regarding social influence, flavoured products, nicotine addiction, and insufficient public awareness. However, the low importance of smoking cessation as a reason for use suggests that the role of electronic cigarettes may differ depending on users' backgrounds and motivations.

5 Prevention and Practical measures

Several prevention tools have been introduced internationally to reduce electronic cigarette use among young people. In the United States, the FDA launched the **The Real Cost campaign** in 2017 to educate young people about the health consequences of vaping and provide accessible prevention materials for students, parents, and teachers. Other measures have included restrictions on flavoured electronic cigarettes in several U.S. states, while the WHO launched the **Stop the Lies campaign** in 2023 to counter misleading claims about tobacco and nicotine products.

In Slovakia, the need for effective prevention is also evident. A 2023 FOCUS survey cited in this study reported that 40% of 15-year-olds used tobacco products, while electronic cigarettes, nicotine pouches, and other alternative products were becoming more popular than traditional cigarettes. Compared with international examples such as The Real Cost and Stop the Lies, these findings suggest that Slovakia could **benefit from stronger, youth-focused prevention tools** combining health education with clear information about nicotine addiction and the risks of vaping.

The findings of the present survey further support the importance of such measures, as most respondents considered **public awareness of the health risks of electronic cigarettes insufficient**, particularly among adolescents. Practical prevention should therefore focus not only on restricting access and advertising, but also on school-based education, communication campaigns, and support for parents and teachers.

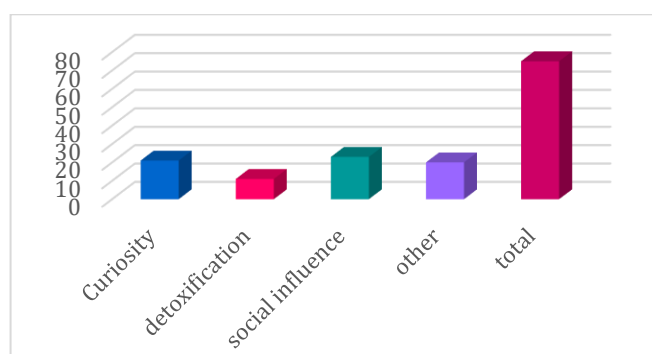


Figure 1.
Reasons for using electronic cigarettes

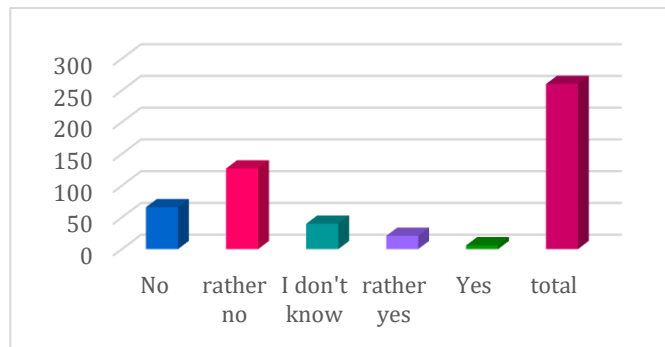


Figure 2.
Public awareness of the use of electronic cigarettes

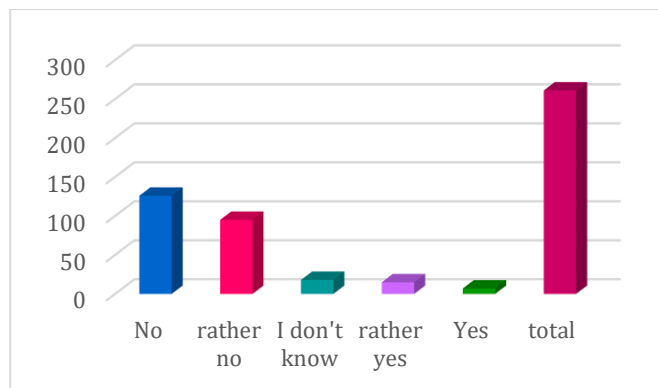


Figure 3.
Awareness among adolescents

6 Conclusion

Electronic cigarettes are often perceived as a modern and less harmful alternative to traditional smoking. However, the results of this study suggest a more complex reality. The survey shows that awareness of health risks is insufficient, social influence plays a key role in use, and addiction remains a significant concern. Therefore, increasing public awareness and implementing effective preventive measures are essential, particularly for the younger generation. Understanding the risks associated with electronic cigarettes is no longer optional — it seems essential, especially for the younger generation.

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