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E-CIGARETTE USE AMONG YOUNG PEOPLE: IMPLICATIONS FOR PUBLIC HEALTH

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ABSTRACT

The use of e-cigarettes has been expanding rapidly among young people, driven by aggressive marketing strategies, the wide availability of attractive flavors, and the misperception that they represent a safe alternative to traditional smoking. However, recent studies point to significant concerns regarding the impacts of this habit on the health and behavior of adolescents and young adults. This study aimed to review the literature on the effects of e-cigarette use in the young population, with emphasis on physical, behavioral, and social aspects. The review was carried out in the SciELO, PubMed, and Lilacs databases, considering articles published between 2013 and 2023. The findings indicate that the consumption of e-cigarettes can lead to nicotine dependence, with an impact on neurological development, in addition to being associated with lung diseases, such as lung injury associated with the use of vaping products (EVALI). Additionally, there is evidence that vaping can influence behavioral changes, including increased impulsivity and a greater predisposition to the use of other substances, such as conventional cigarettes and illicit drugs. In view of these risks, it is concluded that stricter regulatory measures, educational campaigns and prevention programs are essential to contain the growth of this habit among young people. Restricting the commercialization, controlling advertising, and expanding supervision over the sale of these products are essential strategies to reduce damage to public health and avoid the normalization of the use of electronic cigarettes among adolescents.

Keywords: Electronic cigarettes. Youth. Public health. Nicotine dependence. Lung damage.

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INTRODUCTION

In recent decades, electronic cigarettes (e-cigs) have emerged as a modern alternative to traditional smoking, attracting mainly the young population. The popularity of these devices is largely due to the wide availability of attractive flavors, innovative design, and the misperception that they are less harmful than conventional cigarettes (GONIEWICZ et al., 2020). In fact, for Cullen et al. (2019), marketing campaigns and the lack of initial regulation have contributed to a widespread acceptance of e-cigs, resulting in a significant increase in consumption among adolescents and young adults.

While e-cigarettes were initially promoted as a potentially less harmful alternative to smoking, recent studies indicate that their use is not without risk. Inhalation of the aerosols produced by the devices can lead to exposure to nicotine, heavy metals, and other toxic substances, contributing to adverse effects on respiratory and cardiovascular health (BENOWITZ et al., 2022). In addition, according to Primack et al. (2018), evidence points to a "gateway" effect, in which young users of e-cigs are more likely to transition to the consumption of conventional cigarettes and other psychoactive substances.

The increase in e-cigarette consumption among young people raises concerns not only about biological harm, but also about the associated social and behavioral impacts. Early nicotine use can interfere with neurological development, affecting cognition, impulse control, and susceptibility to addiction to other drugs (YOUNG-WOLFF et al., 2020). In addition, the easy access and social acceptance of e-cigs can normalize smoking behavior, contributing to the perpetuation of smoking in society.

In view of this scenario, this study sought to critically analyze the effects of the use of electronic cigarettes on young people, with an emphasis on the biological and social impacts. The justification for this research lies in the need to understand the real risks associated with the consumption of e-cigs and to provide subsidies for effective public policies in the prevention of smoking among the new generations.

THEORETICAL FRAMEWORK

The adoption of e-cigarettes among young people can be understood from three main axes: physical health, nicotine addiction and psychosocial impacts. These devices, initially promoted as a less harmful alternative to conventional cigarettes, have shown worrying effects, especially in the young population, which becomes more vulnerable to their long-term impacts.

As far as physical health is concerned, e-cigarettes are not without risks. Studies indicate that continuous use can trigger a number of respiratory problems, including lung

inflammation and damage to the airways due to exposure to toxic substances present in the aerosols released by the devices. One of the main problems associated with the use of e-cigs is EVALI (E-cigarette or Vaping Product Use-Associated Lung Injury), a syndrome characterized by severe lung injuries resulting from the use of vaping products. According to the UFPR School Agency, chemical components found in vaporized liquids, such as formaldehyde, acrolein, and diacetyl, can trigger inflammation and cell damage, compromising lung function and increasing the risk of chronic respiratory diseases (UFPR, 2024).

In addition to the physical impacts, nicotine dependence is another worrying factor. Nicotine, present in most liquids used in e-cigs, is highly addictive and has significant neurobiological effects, especially on developing brains. Early nicotine use can alter neuronal circuits responsible for impulse control and learning, increasing vulnerability to the development of psychiatric disorders and the use of other substances. According to the Brazilian Medical Association (AMB), the amount of nicotine needed to establish dependence in young people has been estimated at approximately 5 mg per day, equivalent to a quarter of an e-cigarette pod (AMB, 2021). This suggests that frequent exposure can lead to an early and progressive cycle of dependence, making it difficult to quit use and increasing the chances of transitioning to conventional smoking.

The psychosocial impacts of e-cigarette use are also a cause for concern. The aggressive marketing of these devices, combined with the mistaken perception that they are a safe alternative, contributes to the normalization of the habit among young people. The social environment and acceptance of the use of e-cigs in various contexts reinforce the smoking culture and increase the likelihood of experimentation and continued adoption. In addition, research indicates that young users of electronic cigarettes are more predisposed to migrate to the use of traditional cigarettes and other psychoactive substances, perpetuating risky behaviors. The Unesp Journal highlights that the growing popularity of e-cigs among young people raises concerns about the damage to oral health and the strengthening of nicotine dependence, reinforcing the need for effective public policies to curb this trend (UNESP, 2023).

Given these aspects, it is evident that the use of e-cigarettes among young people represents a multifaceted public health problem. The physical health harms, heavy chemical dependence, and psychosocial impacts associated with the use of these devices demonstrate the need for stricter preventive and regulatory approaches. The dissemination of information based on scientific evidence and the implementation of restrictive policies

can play an essential role in reducing the prevalence of this habit among the new generations.

METHODOLOGY

This study consists of an integrative literature review, a methodology that allows a comprehensive analysis of different types of studies, such as experimental and observational research, systematic reviews and epidemiological data, enabling a critical view of the impacts of the use of electronic cigarettes in young people. The search was carried out in the SciELO (Scientific Electronic Library Online), PubMed (US National Library of Medicine) and LILACS (Latin American and Caribbean Literature on Health Sciences) databases, considering publications in the period from 2013 to 2023. To ensure greater accuracy in the retrieval of the studies, descriptors in Portuguese and English were used, selected from the controlled vocabularies DeCS (Health Sciences Descriptors) and MeSH (Medical Subject Headings), combined with Boolean operators. The descriptors used were "electronic cigarettes" OR "e-cigarettes", "youth" OR "youth", "public health" OR "public health", "nicotine dependence" OR "nicotine dependence" and "lung damage".

Original studies and systematic reviews addressing the effects of e-cigarettes on young people were included, as well as epidemiological data on the prevalence of e-cig use in this population. Only research carried out in humans was considered, excluding experimental studies in vitro and in animal models. Articles available in full and published in Portuguese, English or Spanish were accepted. On the other hand, studies whose sample consisted of individuals outside the age range of interest, defined between 10 and 24 years in accordance with the criteria of the World Health Organization (WHO), as well as those focused exclusively on geriatric populations or on high-risk groups, such as patients with preexisting lung diseases, were excluded. Studies that addressed the use of e-cigarettes only as a smoking cessation strategy, without discussing their impacts on the young population, were also disregarded, as were duplicate articles among the databases.

After the initial search, 75 studies were identified that met the established criteria. The selection was carried out in two stages: initially, there was screening through the reading of titles and abstracts, which resulted in the exclusion of 45 articles because they did not meet the inclusion criteria. The remaining 30 articles were submitted to a complete text analysis, leading to the exclusion of another 12 because they did not present relevant data for the objectives of the study. Thus, the final sample was composed of 18 articles. Data analysis was carried out based on an extraction matrix, in which the information was

organized into three main axes: impacts on physical health, nicotine dependence, and psychosocial implications.

The selected studies were critically evaluated, considering the methodological quality, the robustness of the evidence, and the relevance of the findings. The results obtained were interpreted in the light of the current literature and discussed based on theoretical references on public health and chemical dependence, in order to provide a deeper and more grounded understanding of the effects of electronic cigarettes on the young population.

RESULTS AND DISCUSSIONS

The results of this review highlight the increasing prevalence of e-cigarette use among young people, their health impacts, the strong association with nicotine dependence, and the social influences that contribute to the spread of this habit.

PREVALENCE

In recent years, the use of e-cigarettes among young people has increased considerably, especially in high- and middle-income countries. Data from the World Health Organization (WHO) indicate that more than 20% of adolescents and young adults between the ages of 15 and 24 have tried e-cigarettes, with a particularly high prevalence in countries such as the United States, the United Kingdom, and Brazil (WHO, 2022). In Brazil, a survey carried out by the Oswaldo Cruz Foundation (Fiocruz) revealed that approximately 20% of young people between 18 and 24 years old reported the regular use of these devices, while in the age group of 25 to 34 years, the percentage is around 10% (UNESP, 2023).

This growth is driven by a variety of factors, including the misperception that e-cigarettes are a safer alternative to traditional tobacco, the aesthetic appeal of modern devices, and the wide availability of attractive flavors. In addition, for Lunetas (2023), the influence of media and social networks has played a significant role in normalizing use among young people.

HEALTH IMPACTS

The health impacts of e-cigarette use are widely documented in the scientific literature. One of the main associated risks is the development of lung injuries induced by the use of e-cigs (EVALI – E-cigarette or Vaping Product Use-Associated Lung Injury). Studies such as that of Grosch et al. (2021), point out that the aerosols released by the

devices contain toxic substances, including heavy metals (lead, nickel, and cadmium), volatile organic compounds, and ultrafine particles, which can cause inflammation and damage to lung tissue.

In addition to pulmonary risks, there is robust evidence that frequent use of e-cigarettes is associated with higher cardiovascular risks, including high blood pressure, endothelial dysfunction, and increased incidences of myocardial infarctions and strokes (Lunetas, 2023). A study conducted by the CDC (Centers for Disease Control and Prevention) pointed out that prolonged exposure to nicotine and other compounds present in aerosols can result in changes in vascular homeostasis, contributing to the early development of heart disease (CDC, 2022).

BEHAVIOR AND DEPENDENCE

Nicotine dependence in young e-cigarette users is an alarming factor. Data from the US National Institute on Drug Abuse (NIDA) indicate that more than 50% of young people who use e-cigs regularly show signs of chemical dependence, including withdrawal symptoms when they stop using them (NIDA, 2021). According to Thomas et al. (2020), nicotine, a highly addictive substance, directly affects brain development, and can compromise cognitive functions, impulse control, and learning.

Another worrying aspect is the relationship between the use of electronic cigarettes and the initiation of conventional smoking. Longitudinal studies show that young users of e-cigs are twice as likely to switch to traditional cigarette consumption compared to those who have never used these devices (Jones et al., 2019). This is due to the brain's adaptation to nicotine, which leads to the need for increasingly higher doses to obtain the same effects, increasing the predisposition to the use of other psychoactive substances.

In addition to the physical effects, e-cigarette use has been linked to negative mental health impacts. Studies suggest that young people who use these devices have a higher incidence of anxiety, depression, and impulsive behaviors (FT MAGAZINE, 2023). The effects of nicotine on the central nervous system, combined with social stress and peer influence, can aggravate psychological and behavioral disorders.

SOCIAL FACTORS

The normalization of e-cigarette use among young people has been driven by aggressive marketing strategies and the widespread availability of these devices. For Gavaa (2023), many brands use advertising campaigns aimed at teenagers, promoting products with attractive flavors, modern design, and less perception of risk.

In addition, the presence of digital influencers promoting the use of e-cigs on social networks has contributed to the acceptance and popularization of the habit. An analysis conducted by the U.S. Institute of Communication and Public Health revealed that more than 60% of e-cigarette-related content on TikTok, Instagram, and YouTube has a bias in favor of use, highlighting their supposed benefits and minimizing health risks (NIDA, 2022).

Despite efforts by some governments to restrict the marketing and advertising of these devices, regulatory policies are still insufficient in many countries. In Brazil, the National Health Surveillance Agency (ANVISA) has prohibited the sale of electronic cigarettes since 2009, but enforcement has been ineffective, resulting in a growing parallel market that is easily accessible to young people.

The findings of this review highlight that e-cigarette use among young people represents an emerging public health challenge, requiring urgent action to mitigate its impacts. While e-cigs are often promoted as a safer alternative to traditional smoking, they are not without risks, especially for vulnerable populations like adolescents and young adults. Early exposure to nicotine can result in permanent damage to brain development, increased cardiovascular risk, and chemical dependence.

Given this scenario, it is essential to implement stricter regulatory policies, including banning advertising aimed at young people, restricting access to minors, and strengthening educational campaigns on the risks of using e-cigarettes. In addition, there is a need to expand research on the long-term effects of e-cigs on health, allowing the formulation of effective strategies for prevention and cessation of use.

CONCLUSION

The use of e-cigarettes among young people has alarming impacts on public health, highlighting not only the risks of nicotine dependence, but also lung damage and the behavioral consequences associated with early consumption. The growing popularity of these devices among adolescents and young adults reflects the urgent need for stricter regulations, as aggressive marketing strategies and the wide variety of flavors contribute to initial adherence and continuation of the habit. In addition, the false perception of safety in relation to conventional cigarettes has led many young people to underestimate the health risks.

The implementation of effective public policies is essential to mitigate the negative impacts of e-cigarette use. Stricter regulations on marketing, such as restricting the sale of these devices to minors, controlling the ingredients used in liquids, and limiting misleading advertising, can contribute to reducing their attractiveness. In addition, it is essential to

strengthen the inspection of illegal sales and parallel trade, which facilitates indiscriminate access to these products by young people.

In the context of education and awareness, school programs and public health campaigns must address, in an accessible and evidence-based way, the adverse effects of nicotine and toxic substances present in e-cigarette aerosols. Strategies aimed at social media and educational settings can play a crucial role in preventing early use by debunking the idea that vaping is a safe alternative to smoking. In addition, the development of specific cessation programs for young users of e-cigs, which combine psychological support and therapies to control dependence, can be an effective measure to help reduce this behavior.

Despite the contributions of this review, some limitations should be considered. The main limitation is related to the methodological heterogeneity of the studies analyzed, which present variations in the inclusion criteria, in the evaluation periods and in the populations studied, which may impact the comparability of the results. In addition, the relatively recent nature of widespread e-cigarette use limits the availability of long-term studies, making it difficult to fully assess their chronic health impacts.

Another point to be highlighted is the rapid evolution of the vaping industry, which constantly launches new devices, technologies, and liquid compounds, making it challenging to keep up with all the changes and their respective effects on health. As a consequence, the available data may not fully reflect the most current consumption trends and their impacts on youth.

Given the gaps identified, future research can deepen the understanding of the long-term effects of e-cigarette use, especially in young people who start smoking in adolescence. Longitudinal studies that follow this population over the years are key to identifying potential associations between vaping and the development of chronic respiratory diseases, cardiovascular diseases, and psychiatric disorders.

In addition, research evaluating the effectiveness of different approaches to e-cigarette cessation among young people can provide more concrete guidelines for public policy formulation and intervention strategies. Another relevant line of research is the analysis of the impact of regulations and educational campaigns already implemented in different countries, allowing the comparison of approaches and the identification of more effective practices in reducing consumption.

Finally, considering the central role of digital media in the spread of e-cigarette use among young people, studies exploring the impact of social media on adolescents' risk perception and behavior in relation to vaping may be key to the formulation of more effective communication policies and the development of targeted preventive campaigns.

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