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EM DEBATE

ORIGINAL ARTICLE

Between policies and realities: The use of electronic cigarettes and other drugs among adolescents

Entre políticas e realidades: o uso de cigarros eletrônicos e outras drogas entre adolescentes

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DOI: 10.1590/2358-28982026E110353I

ABSTRACT The study aimed to analyze adolescents' knowledge and attitudes regarding the use of electronic cigarettes and other drugs. This quantitative study was conducted with 119 adolescents enrolled in two public High Schools in rural Rio Grande do Norte in 2024. Data were collected through a questionnaire, and statistical analysis was performed using STATA software, version 18.0. Findings indicate unanimous knowledge about the product, as 95% of participants reported receiving negative information about electronic cigarettes, acknowledging their harms, and this awareness did not prevent their use. The data suggest that electronic cigarettes are strongly linked to socialization, as more than 66% of respondents witnessed friends using them, reinforcing a sense of permissibility and normalizing consumption. The attitudes of approach and the consumption of electronic cigarettes and other drugs by adolescents point to the need for health education actions that enter other spaces, such as schools and entertainment environments aimed at young people. Policies must be designed to engage directly with adolescents, ensuring they can better understand and internalize the information provided.

KEYWORDS Students. Adolescent health. E-cigarette vapor. Drug-seeking behavior.

RESUMO *Objetivou-se analisar os conhecimentos e as atitudes de adolescentes acerca do uso de cigarros eletrônicos e outras drogas. Pesquisa quantitativa, realizada em duas escolas públicas de ensino médio localizadas no interior do Rio Grande do Norte no ano de 2024. Os participantes somam 119 adolescentes, a coleta de dados foi realizada mediante um questionário e a análise estatística, por meio do programa Stata versão 18.0. Os achados mostram unanimidade de conhecimento sobre o produto, aproximadamente 95% dos participantes afirmam que receberam informações negativas sobre o item, conhecem os malefícios, mas que isso não impede o uso. Ademais, os dados inferem que o cigarro eletrônico está fortemente atrelado à socialização, pois mais de 66% dos respondentes presenciaram amigos fazendo uso do entorpecente, o que acaba por transmitir a ideia de permissibilidade e normalização do uso. As atitudes de aproximação e o consumo de cigarros eletrônicos e outras drogas por adolescentes apontam para a necessidade de ações de educação em saúde que adentrem em outros espaços, a exemplo de escolas e ambientes de entretenimento voltados para os jovens. Logo, é necessário que as políticas sejam pensadas e dialoguem diretamente com os adolescentes, de modo que estes consigam assimilar melhor as informações.*

PALAVRAS-CHAVE *Estudantes. Saúde do adolescente. Vapor do cigarro eletrônico. Comportamento de procura de droga.*

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Introduction

In the contemporary setting, drug experimentation during adolescence can trigger the reemergence of seemingly overcome problems. Research conducted in the United States between 2017 and 2019 revealed that adolescents who use e-cigarettes are more likely to also consume marijuana and alcohol. Analyzing adolescents' involvement with psychoactive substances reveals a troubling backdrop for public health, one that transcends the smoking problem. Analyses indicate that the consumption of alcoholic beverages and illicit drugs, such as marijuana, is significant among students[1].

Although tobacco use has declined, it remains a public health concern, in part due to persistent attacks from the tobacco industry. According to the National Cancer Institute (INCA), smoking is characterized as a chronic disease resulting from dependence caused by nicotine in tobacco products[2].

Nicotine-releasing electronic devices, popularly known as e-cigarettes, were launched to reduce the harm of regular cigarettes and support tobacco use treatment, as they allow for the gradual reduction of nicotine until its elimination[3]. The device market offers a wide variety of products, such as vapers, pods, e-cigarettes, among other types that vary according to details, such as the number of puffs.

From this perspective, one concern that deserves attention regarding electronic devices is the fact that they have become an attraction for teenagers. As a result, Brazil has established laws, actions, and public policies directed at children and adolescents, emphatically in mental health, aiming at a healthy development process at this life stage[4].

In Brazil, the most recent National Drug Policy (PNAD) was established through Decree Nº9.761/2019[5]. Despite its setbacks, we underscore the relevance of developing anti-drug strategies for younger people, considering that the harmful impacts of consumption in this age group are more intense than in older groups because adolescence is naturally a critical and vulnerable phase for drug use initiation[6].

Regarding the issue of drug use among adolescents, the 2021 World Drug Report, produced by the United Nations Office on Drugs and Crime (UNODC), indicates that, among people aged 15-64, the highest levels of drug use are observed among those aged 18-25. Therefore, adolescents and young people make up most of the population that consumes drugs[7].

Regarding electronic cigarettes, the sale, import, and advertising of any Electronic Smoking Devices (ESDs) have been prohibited in Brazil since 2009. In its most recent update, the regulation of these products maintained the restriction – a decision based on a broad analysis of their risks and effects on public health. Resolution of the Collegiate Board (RDC) Nº855/2024 prohibits the sale, import, storage, transport, and dissemination of ESDs and reaffirms the prohibition of their use in enclosed public or private collective environments[8].

The rising tobacco use and the use of products containing this compound and other drugs during adolescence is a troubling issue, given the harm of these habits due to their increasingly early introduction during a delicate life stage, which can be decisive for adulthood. Therefore, there is a growing need for studies to understand this consumption and support international and national agendas and commitments on this issue[9].

Addressing this topic is also crucial because it aligns with some of the UN Sustainable Development Goals (SDGs), which are expected to be achieved by 2030. The topic is closely related to and contributes to health and well-being, which aim to ensure a healthy life and promote quality of life for all at all ages, and whose goals include preventing the use and abuse of narcotic drugs and alcohol and strengthening the implementation of the Framework Convention on Tobacco Control in all countries[10].

Given this context, this study aims to analyze the knowledge and attitudes of adolescents regarding the use of electronic cigarettes and other drugs, with a discussion in light of public policies, goals, and social contexts.

Material and methods

This quantitative study was conducted from June to December 2024 in public high schools in a rural municipality of Rio Grande do Norte, Brazil. The sample size was determined using finite population calculations, and consisted of 550 adolescents. So, considering a 95% confidence level and a 5% sampling error, the estimated sample size was 171 adolescents, with an exact number of 119 adolescents aged 14-17 years by purposeful sampling. The participants were recruited from a specific location, namely, schools, where the target population of the research was found.

We included adolescents aged 14-17 years regularly enrolled in high school at the selected schools. Consequently, we excluded adolescents with cognitive impairments that prevented them from answering the interview and students who were absent from activities during data collection.

Data were collected through online and printed forms, and the link was sent to the participants' email addresses. The questions addressed their first experience with electronic cigarettes, frequency of use, awareness of the harm caused, whether there was influence from another person, whether they had tried other types of cigarettes, and whether they believed that the use of electronic cigarettes may have influenced their decision to use them.

The statistical analysis was performed through the Stata program (StataCorp. Stata Statistical Software: Release 18. College Station, TX: StataCorp LLC.) version 18.0, and the data were expressed as simple frequency and percentage values. In this sense, the association of the different variables studied with the use of electronic cigarettes was verified using the Odds Ratio (OR) and a 95% confidence interval, with significance levels obtained through the chi-square test or Fisher's exact test.

However, this latter method was used when the expected frequencies were less than five. Thus, a logistic regression model was created to verify the variables' mutual influence. Initially, the variables statistically associated with the outcome in the univariate analysis participated in the logistic model, and only those with a p-value < 0.05 remained in the final model. The Hosmer-Lemeshow test was employed to verify the adequacy of the logistic model, with a 5% significance level.

This study was conducted under the ethical and scientific guidelines established by Resolution Nº466 of December 12, 2012, of the National Health Council/Ministry of Health[11] and its complementary resolutions, which guide and regulate human research. Because the participants were adolescents, parents/guardians signed the Informed Consent Form, authorizing the young people's participation in the research. The adolescents signed the Informed Assent Form, agreeing to participate. The research was submitted to the Research Ethics Committee of the State University of Rio Grande do Norte and approved with Certificate of Presentation for Ethical Review (CAAE) Nº77806724.6.0000.5294 and Opinion Nº6.734.351.

Results

Table 1 portrays the characteristics of the participating adolescents, the information, experiences, and attitudes regarding the use of electronic cigarettes and other drugs in Pau dos Ferros, Rio Grande do Norte, Brazil, in 2024.

Table 1. Characterization of participating adolescents, Pau do Ferros, Rio Grande do Norte, Brazil, 2024

Variables	Freq.	%
Gender		
Male	68	57.14
Female	48	40.34
Not informed	3	2.52
Total	119	100.00
Age		
15 years	8	6.72
16 years	56	47.06
17 years	52	43.70
Not informed	3	2.52
Total	119	100.00
School year		
First	25	21.01
Second	91	76.47
Third	3	2.52
Total	119	100.00
Knows how to distinguish between illegal and legal drugs		
Yes	85	71.43
No	34	28.57
Total	119	100.00
Heard about electronic cigarettes		
Yes	119	100.00
No	0	0.00
Total	119	100.00
Experimented with illegal drugs		
Yes	14	11.76
No	103	86.55
Not informed	2	1.68
Total	119	100.00
Received negative information about electronic cigarettes		
Yes	113	94.96
No	6	5.04
Total	119	100.00
Witnessed friends using e-cigarettes		
Yes	79	66.39
No	40	33.61
Total	119	100.00
Received guidance on electronic cigarettes		
Yes	46	38.66
No	73	61.34
Total	119	100.00

Table 1. Characterization of participating adolescents, Pau do Ferros, Rio Grande do Norte, Brazil, 2024

Variables	Freq.	%
Electronic cigarettes are more harmful		
Totally disagree	4	3.36
Partially disagree	14	11.76
Neither agree nor disagree	13	10.92
Partially agree	43	36.13
Totally agree	45	37.82
Total	119	100.00
Electronic cigarettes have a lower potential for addiction		
Totally disagree	40	33.61
Partially disagree	16	13.45
Neither agree nor disagree	12	10.08
Partially agree	30	25.21
Totally agree	19	15.97
Not informed	2	1.68
Total	119	100.00
Using electronic cigarettes increases experimentation with other substances		
Totally disagree	6	5.04
Partially disagree	8	6.72
Neither agree nor disagree	9	7.56
Partially agree	40	33.61
Totally agree	53	44.54
Not informed	3	2.52
Total	119	100.00
Experimentation age		
13 years	4	3.36
14 years	7	5.88
15 years	21	17.65
16 years	10	8.40
17 years	2	1.68
Did not experiment	75	63.03
Total	119	100.00
*** First experience was associated with alcohol**		
Yes	10	22.70
No	34	77.30
Total	44	100.00
*** Where did you get access to the electronic cigarette?**		
Friends at a party	30	68.18
Friends at school	7	15.91
Physical store	2	4.55
Friends at a party and at home	2	4.55
Internet	1	2.27
At home	1	2.27
Did not respond	1	2.27
Total	44	100.00
*** Frequency of electronic cigarette use**		
Just experimented	27	61.36
Socially	15	34.09
Three times a day	1	2.27
Did not respond	1	2.27
Total	44	100.00

Table 1. Characterization of participating adolescents, Pau do Ferros, Rio Grande do Norte, Brazil, 2024

Variables	Freq.	%
*** How interest in experimenting arose**		
Saw other peers	16	36.36
Attracted to the device	14	31.82
Friends	11	25.00
Digital influencer	1	2.27
Did not respond	2	4.55
Total	44	100.00

Source: Prepared by the authors.

*Questions answered only by participants who stated they had already used electronic cigarettes (n=44).

Observing *table 1* data, we understand the profile of young people, their behaviors, relationships, and beliefs regarding electronic cigarettes and other drugs. Initially, most respondents were boys around 16 years old in their second High School year. Although these reports are descriptive, we can infer that some of the components of this sample have already submitted to the initial process of High School, marked by attempts to adapt and form bonds and habits, which can be conflictual during this period.

It is evident that the participating adolescents are familiar with the concepts of illicit and licit drugs. Therefore, they distinguish between what is prohibited and possibly the reasons for it. However, even within this group, approximately 12% of them report having tried illicit drugs, raising the question of why they would try them, given their awareness of the harmful effects (*table 1*).

In the case of electronic cigarettes, there is unanimous knowledge about the product, which is not surprising given its popularity. In fact, most participants claim to know negative information about the item, but not necessarily the harmful effects that prevent its use, especially since the findings suggest that electronic cigarettes are strongly linked to socialization, as more than 66% of respondents have witnessed friends using them, which ultimately conveys the idea of permissibility and normalization of their use.

Another interesting fact is that, although the responses indicate knowledge about electronic cigarettes, 61.34% had not received any information, which leads us to reflect on where the information obtained derives from and question its reliability: whether it comes from professionals, health, education and society information outlets, or from people concerned about the issue and these young people (*table 1*).

Regarding beliefs about electronic cigarettes, the findings diverged among young people, as, when considering their potential for harm, only 74% believe that they are more harmful than other types of drugs, and the remaining perceptions fluctuate, showing that young people are aware of this product but have doubts about it. The statement is confirmed again when questioning the potential for addiction to electronic cigarettes and whether it is less than that of other drugs. Regarding this result, we noted a discrepancy of 33.61% who totally disagree and 15.97% who totally agree. These findings point to the essential need to create environments to talk about the product in places attended by young people, such as schools (*table 1*).

Most participants believe that experimenting with e-cigarettes influences, in some way, experimenting with other substances. However, even with this awareness, use still occurs at an early age, as confirmed by the findings: approximately 72.72% of respondents who have tried e-cigarettes had their first contact at the age 15 or younger. Conversely, interesting data indicates that more than 77% of respondents did not experiment with cigarettes in conjunction with alcohol, which prompts us to reflect on experimentation: Is it the environment? The acquaintances? In the absence of alcohol, are there other types of drugs associated? In this research, the environments mentioned are diverse, but more than 72% of respondents stated that it was during festive and collective events, reiterating the idea of the e-cigarette as a socializing device (*table 1*).

The previous statements also relate to the responses regarding the emergence of the desire to try it, showing that more than 64% saw peers or friends using the product, followed by the attraction of the device, which, unlike old cigarettes, is aesthetically more modern and appealing (*table 1*). Furthermore, there is also the increasing influence of the digital industry itself, which favors the presentation of the product by celebrities who, proportionally, are followed by young people on digital platforms.

On the other hand, the usage data is interesting because it shows that more than 61% of respondents only tried it, suggesting that perhaps the behavior is also driven by curiosity to know what it is like. Regarding this, 34.09% of the survey respondents say they use it socially; however, the answer does not seem broad enough to explain the practice: Would 'socially' only be used at festive events? Weekly? Routinely? Among the responses, a small number (2.27%) of subjects use it daily or at least three times a week. However, these young people are receiving some type of follow-up from health professionals to assess how this practice has affected them (*table 1*).

Discussion

Tobacco use, in general, has been the target of several policies in Brazil and worldwide, focusing on curbing consumption of this product. Brazil has, for some time now, imposed control over marketing actions, a ban on advertising, and higher taxes on cigarette sales, toward making them less accessible to the population. In addition, campaigns and actions from reputable public bodies, such as the Ministry of Health, are produced and aired to clarify the product's harmful effects to the population[12].

In tobacco control, we should mention the adherence to the Framework Convention in 2006 and the enactment of the 2014 law that regulated the prohibition of tobacco advertising and marketing to minors. Furthermore, actions were aligned by governance bodies towards the Sustainable Development Goals (SDGs) for 2030. However, noteworthy is the fact that periods of political and economic crisis directly influence the population's health issues and lifestyles, as well as the current government's stance on tobacco regulation. Therefore, this process fluctuates over time, meaning that there have been and are moments in history when the enforcement of regulations on these products was relaxed and the illegal trade in these compounds thrived[13].

Indeed, although these proposals have been useful and have curbed Brazilian cigarette production by at least 45%, the market has adapted, creating products and targeting other groups, such as young people. Currently, there is strong industrial pressure for the National Health Surveillance Agency (ANVISA) to regulate electronic smoking devices, also called vapes, e-cigarettes, or electronic cigarettes[12].

Thus, the media has attempted to present electronic cigarettes to the public with the idea that they are less harmful than traditional cigarettes. The advertising is based on the premise that the device does not perform combustion (a chemical reaction that releases heat) and, therefore, is less harmful. However, the heating of liquids containing products

such as nicotine, THC, flavorings, and other compounds generates particles with heavy metals, harmful aldehydes, and volatile organic particles that harm the human body[14].

Vitamin E acetate, for example, is commonly found in e-cigarettes and has a high pulmonary toxicity potential. This substance aims to expand fluid viscosity, and its excess in the lungs is associated with lipoid pneumonia, as it generates inflammation and hypoxia caused by problems in gas exchange. Furthermore, users may experience long-term problems, such as some types of bronchitis, asthma, and other lung diseases, including acute lung injury. Also, this substance is cancer risk factor. We should highlight that, sometimes, the users most affected by pathologies arising from electronic cigarettes did not have respiratory problems previously. These findings suggest that health policies and care should increasingly be directed towards this specific product, so that its harmful effects are publicized and it becomes less attractive and commonly used by young people and adults[14].

The definition of legal and illegal drugs relates to how they can be acquired by users. Legal drugs, such as alcohol and cigarettes, can be freely sold and consumed in specific environments, or acquired with a prescription, in the case of medications. Legal drugs do not always produce visible reactions in the body, while illegal drugs are more related to physical and mental changes because they affect the neurological system of individuals and generate aggressive impulses. Illegal drugs are repressed and come in different types. The discussion of exposure to legal and illegal drugs involves several layers; one can infer that the family can be a risk factor, along with genetic and environmental issues. However, contact with drugs knowingly makes young people vulnerable to unprotected sex, STIs, early pregnancy, and urban violence[15].

In the meantime, the importance of policies such as the Mental Health, Alcohol and Other Drugs Policy is understandable, in order to provide young people with a more peaceful and safe adolescence. However, from 2016 to 2021, this policy was considerably dismantled due to the strengthening of health privatization and the COVID-19 pandemic. A notable consolidation of psychiatric hospitals and institutions with religious ties was observed during this process, with a re-institutionalization logic and health seen as a market[16].

The setbacks in Mental Health, Alcohol and Other Drugs Policy are troubling and affect thousands of people in different age groups. However, when considering young people, the repercussions of these problems can be greater, as the network that supports this population is already fragile. The intersectoral relationship between the school, an important environment for adolescent life, and health services is weakened, compromising health promotion and drug use prevention. This situation makes young people susceptible to other types of influence and information[17].

Regarding health policies and services, the limited prevention, care, and harm reduction actions are well known. Therefore, in developing Individual Therapeutic Projects (ITPs) for vulnerable adolescents, it is essential to align with the principles of the Unified Health System (SUS), the Psychosocial Care Network (RAPS), and harm reduction strategies, considering the sociocultural context of young people and the complexities inherent in the use of or vulnerability to the use of electronic cigarettes and other substances[18].

Considering experiences and environments, one should emphasize the issue of influence, which should always be considered when thinking about young people and drug use, because, unlike other social groups, adolescence carries the pressure of acceptance, socialization, and the fear of social stigmatization. Therefore, adolescents may engage in harmful social environments, contexts, and actions simply out of a desire for acceptance, coupled with a lack of maturity, and a search to alleviate internal and external conflicts in their lives through the drug-derived sensations. However, notably, adolescents with

some social belief or a better understanding of themselves cope better with conflicts and social pressure that influence drug use[19].

However, in general, the studies found in this research are consistent with the findings of other studies. This is because the scientific literature warns of a considerable increase in the daily use of e-cigarettes and other drugs, as well as experimentation that leads directly to nicotine dependence. The dependence profile of electronic cigarettes and other products, such as hookahs, differs from that of traditional industrial cigarettes by varying in nicotine concentrations, models and types, as well as in the dependence profile. While dependence on traditional cigarettes is generally linked to people with low schooling and income levels, electronic cigarettes and hookahs are more associated with groups with higher schooling levels and better purchasing power[20].

Limitations include the barriers to discussing e-cigarette and other drug use with participants, meaning data collection was only possible through questionnaires, as most adolescents rejected any attempt at interviews or conversations. Furthermore, some questions were not answered by all participants.

Conclusions

Based on the results, one can reflect on the origin of this information, since more than half of the sample claims not to receive it. The data show that the participating school adolescents are familiar with electronic cigarettes, have more precise information such as adverse effects, and know that they are more harmful than regular cigarettes and that they increase the risk of experimenting with other drugs. However, possessing this information does not inhibit attitudes towards their use, since some have already experimented with legal and illegal drugs through friends and at parties.

The tendency towards and consumption of electronic cigarettes and other drugs by adolescents points to the need for health education initiatives aimed at school-aged adolescents, as well as policies and strategies to combat the use of electronic cigarettes. Thus, it is necessary to reach other spaces, such as schools and youth entertainment venues, and strengthen partnerships between sectors such as health and education. Thus, policies must be designed and directly engaged with adolescents so that they can better understand information about electronic cigarettes and other drugs.

Authorship contributions

Ferreira Júnior AR (0000-0002-9483-8060)* contributed to the drafting and critical review of the manuscript. Paiva AVM (0009-0006-8491-6500)* and Dantas JG (0009-0007-5461-0460)* contributed to the collection, analysis, and interpretation of the manuscript data. Assis JCL (0000-0003-1327-3385)* contributed to the final approval of the manuscript. Freitas RJM (0000-0002-5528-2995)* and Oliveira KKD (0000-0001-7713-3264)* contributed to the study conception and design. Lima MVC (0000-0002-9278-5612)* contributed to the study conception and design, data collection, analysis and interpretation, and manuscript writing and critical review. ■

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Received on 03/19/2025
Approved on 10/31/2025
Conflict of interest: Non-existent
Data availability: The research data is contained within the manuscript itself
Financial support:Non-existent

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