




INFLUENCE OF ELECTRONIC CIGARETTES ON ORAL HEALTH

 <https://doi.org/10.56238/levv15n43-007>

Submitted on: 03/11/2024

Publication date: 03/12/2024

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ABSTRACT

Electronic cigarettes, popularly known as e-cigarettes or vapes, have been widely adopted as an alternative to traditional cigarettes, especially among young people and adolescents. However, the impacts of these devices on oral health are concerning. The presence of nicotine, propylene glycol, glycerin, and flavorings in the liquids used in e-cigarettes can cause dryness of the mouth, inflammation of the gums, changes in the pH of saliva, and other oral problems, such as tooth decay and periodontal disease. This study explores the chemical composition of e-cigarettes and their effects on the oral cavity, comparing them to the harms caused by traditional cigarettes, and emphasizes the importance of proper regulation and awareness campaigns on the oral health risks associated with the use of these devices.

Keywords: Electronic Cigarette. Oral Health. Nicotine.

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INTRODUCTION

Electronic cigarettes, popularly known as e-cigarettes or vapes, have been gaining popularity as an alternative to traditional cigarettes, especially among young people and teenagers. These devices work by vaporizing liquids that contain nicotine, propylene glycol, vegetable glycerin, and a variety of flavorings. Although initially promoted as a less unhealthy option, the negative impacts of e-cigarettes on oral health have become a growing concern. The nicotine present in e-cigarette liquids is a vasoconstrictor substance that compromises blood circulation in the oral cavity, impairing wound healing and increasing the risk of developing periodontal diseases. In addition, solvents such as propylene glycol and vegetable glycerin can cause irritation in the oral mucous membranes and contribute to the dryness of the mouth, a factor that favors the accumulation of bacterial plaque and the development of cavities. Flavorings, often added to improve taste, can also be harmful, causing allergic reactions and irritations to the oral mucosa.

The growing popularity of e-cigarettes among young people and adults, coupled with the lack of regulation and clear information about their risks, makes it imperative to investigate the specific impacts of these devices on oral health. Several studies have pointed to an association between prolonged use of electronic cigarettes and an increased risk of developing oral diseases, such as cavities, gingivitis, and oral leukoplakia. In addition, the possibility of changes in the oral microbiome and the risks of developing precancerous conditions highlight the need for a greater understanding of these effects. There is a need to clarify how the use of electronic cigarettes can affect oral health, offering subsidies for the creation of public policies and appropriate clinical practices. A better understanding of these impacts will allow us to develop prevention and awareness strategies, especially aimed at young people, who are more susceptible to adopting this habit.

Thus, the present work has the general objective of analyzing the impacts of electronic cigarettes on oral health, focusing on the effects of their main chemical components, such as nicotine, propylene glycol and glycerin. The aim is to evaluate the relationship between the use of these devices and the development of oral problems, such as caries, periodontal diseases, mucosal lesions, and precancerous conditions, in addition to comparing their effects to those of traditional cigarettes and proposing preventive strategies to minimize their damage.



METHODOLOGY

This work consists of a literature review focused on the analysis of the impacts of electronic cigarettes on oral health. The search was carried out in the PUBMED and Google Scholar databases, recognized for its wide collection of scientific articles in the health area.

The search process was conducted using specific keywords such as "*electronic cigarette*," "*oral health*," "*nicotine*," "*gingivitis*," "*periodontitis*," among other relevant terms. Articles published in the last 10 years were included, ensuring the timeliness of the information. The selection of studies followed strict inclusion criteria, such as the presence of data directly related to the effects of e-cigarettes on the oral cavity and the exclusion of studies that did not address the central theme or that were outside the established temporal scope.

The analysis of the selected articles focused on the identification and description of the main chemical components present in e-cigarette liquids and their effects on oral health, in addition to comparing these effects with those caused by traditional cigarettes. Studies that addressed the population's perception of the risks associated with the use of electronic cigarettes for oral health were also considered.

LITERATURE REVIEW

ORAL DRYNESS AND CHANGES IN SALIVARY PH

Vaporization of liquids containing propylene glycol and vegetable glycerin can cause severe oral dryness, a condition that affects salivary pH balance. This imbalance creates an environment conducive to bacterial growth, increasing the risk of caries and periodontal disease². Saliva plays a key role in protecting the oral cavity, and its reduction impairs the mouth's natural ability to neutralize acids and repair tissues. Flavorings, present in vaporized liquids, are also pointed out as factors that aggravate this condition, promoting allergic reactions and irritation in the mucous membranes³.

LESIONS IN THE ORAL MUCOSA AND PRECANCEROUS CONDITIONS

Long-term use of e-cigarettes is associated with lesions in the oral mucosa, including ulcers, angular cheilitis, and even oral leukoplakia. Studies suggest that compounds present in vapor, such as formaldehyde and heavy metals, cause chronic irritation and cell damage⁴. These substances have carcinogenic potential, with genetic alterations that can increase the risk of oral cancer⁵. In addition, the heat generated by



vaporization can dehydrate the mucous membranes, compromising their integrity and making them more susceptible to bacterial and fungal infections⁷.

RELATIONSHIP WITH PERIODONTAL DISEASES

The impact of e-cigarettes on periodontal tissues is significant. The nicotine present in vaporized liquids is a vasoconstrictor substance that reduces blood circulation in the gingival tissues, compromising their nutrition and hindering the healing process⁶. Chronic exposure to steam contributes to changes in the oral microbiota, promoting the proliferation of pathogenic bacteria associated with diseases such as gingivitis and periodontitis⁸. These effects make users more prone to bone loss and gum recession, conditions that negatively impact long-term oral health⁹.

CHANGES IN TASTE AND NUTRITIONAL IMPACTS

E-cigarette users often report changes in taste, which can impair the perception of food flavors⁸. This condition can lead to nutritional imbalances, as difficulty enjoying food can negatively influence eating habits. Although some research suggests that these changes are reversible with cessation of use, the short-term impacts are significant and deserve clinical attention¹⁰.

PREVENTIVE STRATEGIES AND DENTAL FOLLOW-UP

Preventing the harm caused by e-cigarettes requires a multidisciplinary approach. Measures such as regular tooth brushing, flossing and mouthwash, as well as periodic visits to the dentist, are essential to monitor oral health and identify possible complications early¹. Reducing the consumption of devices or opting for liquids with lower nicotine content and without aggressive chemical additives can contribute to minimizing the risks. Additionally, a balanced diet rich in essential nutrients for oral health and user awareness of the risks associated with e-cigarettes are important tools to preserve oral health⁸.

FINAL THOUGHTS ON THE LITERATURE REVIEW

The effects of e-cigarettes on oral health are varied and concerning, ranging from dry mouth to the development of precancerous conditions. Although it is considered by some to be a less harmful alternative to traditional cigarettes, data in the literature indicate that the risks should not be ignored. Awareness of the potential harms associated with e-cigarette use is essential for promoting healthy habits and preventing serious dental complications. The adoption of appropriate preventive measures, associated with regular

dental follow-up, is essential to ensure the maintenance of oral health in the face of the increasing use of these devices⁹.

DISCUSSION

This study addresses the adverse impacts of e-cigarettes on oral health, highlighting the main risk factors related to their chemical components and the long-term effects on the oral cavity. The analysis compares the damage caused by electronic cigarettes with that caused by traditional cigarettes and explores studies that sometimes corroborate, sometimes diverge, in relation to the effects of specific substances, such as nicotine, propylene glycol and flavorings, in the development of oral and systemic diseases.

The use of electronic cigarettes has been linked to a number of oral complications, such as caries, periodontal disease, and dryness of the mouth. A study by Silva ¹ suggests that vasoconstriction caused by nicotine compromises circulation in the oral cavity, impairing healing and increasing the risk of gingivitis and periodontitis, similar to the effects of traditional cigarettes. However, the research by Gotts et al.¹⁰ raises an important question: while conventional cigarettes release carcinogenic toxins due to combustion, e-cigarettes expose users to new compounds, such as heavy metals and aldehydes, whose safety is not yet clearly established, which brings uncertainty about the magnitude of the harm.

Regarding the increase in caries, studies by Garcia and Santos ⁸ indicate that the sugars present in flavorings contribute to the demineralization of tooth enamel, similar to the consumption of sugary products. However, Zhang and Wen ²¹ point out that, although the harms are evident, the direct effects vary according to the profile of use and frequency, suggesting that moderate consumption or the replacement of flavored liquids with unsweetened ones can reduce the impacts, pointing to the importance of regulating these components.

The potential carcinogenicity of e-cigarettes is also controversial. While Sousa and Rodrigues ⁹ identified cellular and genetic alterations that increase the risk of oral cancer, Sousa et al.¹ indicate that longitudinal studies are necessary to establish a definitive causal relationship. Oates et al. ²² argue that toxin levels may be insufficient to trigger carcinogenesis compared to traditional cigarettes; however, they caution that further studies are needed.

Regarding the development of periodontal diseases, a study by Jordi and Oliveira ⁴ points to a relationship between exposure to e-cigarette vapor and the imbalance of the



oral microbiota, increasing the proliferation of pathogenic bacteria. On the other hand, Hamann et al.¹⁵ argue that the effects may potentially be less intense than those observed in conventional cigarette users, as e-cigarettes do not release some of the carcinogens present in traditional smoke.

Studies suggest that the prolonged use of electronic cigarettes can alter taste, impacting eating habits and contributing to nutritional deficiencies, as observed by Santos and Oliveira⁵. However, Meo and Asiri²³ state that this change may be reversible with the cessation of use of the device, indicating that the negative effects can be mitigated with discontinuation.

This analysis of the studies reveals that despite being considered less harmful than traditional cigarettes, e-cigarettes still pose oral health risks. The variability of the impacts observed reinforces the need for adequate regulation, public awareness and dental follow-up of users.

CONCLUSION

It is concluded that the use of electronic cigarettes, although often considered a less harmful alternative to traditional cigarettes, poses significant risks to oral health. This study revealed that the main components of these devices, such as nicotine, propylene glycol, and flavorings, can cause problems such as dryness of the mouth, increased risk of caries, periodontal disease, and possible precancerous lesions. These findings highlight the need for strict regulation and educational campaigns to warn about the oral risks associated with the use of e-cigarettes, especially among young people, contributing to the promotion of safer and more informed oral health.



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