

Electronic Cigarette Effects on Periodontal Health
Olga Bondaresco D202
New York City College of Technology

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Abstract

E-cigarettes have become extremely popular among the youth since they were introduced in 2003. To a large extent, vaping has replaced smoking because it is perceived to be safer. Emerging research is pointing to the adverse oral health impacts of e-cigarette use. One of the main health consequences of vaping is tooth discoloration. E-cigarette users are more likely to suffer from dental staining than non-users. In this respect, vaping is similar to smoking. Flavored e-liquid is more likely to cause tooth discoloration than non-flavored e-liquid. E-cigarette use also causes periodontal disease. Vaping causes carbonyl stress which inflames periodontal tissue. The Greater New York Dental Convention Poster representative conveyed a sense of urgency in the prevention of e-cigarette related oral health damage. Dentists and hygienists have a vital role in addressing the effects of e-cigarettes by promoting smoking cessation in dental clinical practice. Although the research on effects of e-cigarette use is scanty, there is reliable evidence that it has serious dental health consequences.

Background

The rapid popularity of e-cigarette use has generated new healthcare concerns. There are a growing number of studies pointing to the impact of e-cigarette vapor on periodontal health. E-cigarette refers to electronic devices which deliver nicotine by vaporizing it. E-liquid contains flavorings, glycerin, propylene glycol, water, and nicotine. There is a perception that e-cigarette is less harmful to consumers in comparison to conventional smoking. The perception hassled to a growing number of users in the last decade. Over time, the presumption that e-cigarettes are safer has proven false. Studies have shown that e-cigarette vapor produces harmful effects in periodontal ligament. There is no doubt that e-cigarette vaping has an impact on pathogenesis of periodontal disease.

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E-cigarette has an impact on the visual appearance of teeth. The use of e-cigarettes has an impact on dental and oral structures. A study found that exposure to the vaporized chemicals in e-cigarettes causes changes in dental enamel color (Scott Froum, DDS, and Alisa Neymark, DDS, 2019). In fact, flavored e-liquids caused more color change than non-flavored e-liquids. Besides, e-liquids with different nicotine contents contribute to changes in the appearance of the enamel.

Dental esthetics can be altered by clinical significance electronic cigarettes. A study by Zanetti, Zhao, Pan, Peitsch, Hoeng, and Ren (2019) found that e-cigarettes cause the discoloration of enamel and dentin. The experimental researcher ascertained that e-cigarette use

causes significant dental discoloration. Tooth discoloration is more common in smokers than non-smokers. Therefore, smoking in general tends to have a negative impact on dental aesthetics. Smoking increases the risk of severe discoloration. It is not possible to reverse tooth discoloration as a result of e-cigarette use. Breaching or brushing has no impact on vaping induced tooth discoloration.

Zanetti, F., Zhao, X., Pan, J., Peitsch, M. C., Hoeng, J., & Ren, Y. (2019) supported the growing evidence that e-cigarette use causes dental discoloration. The study found that flavored e-liquids have a greater impact on tooth discoloration in comparison to non-flavored e-liquid. The role of flavors was identified in changing tooth color. They also argued that menthol and tobacco e-liquids change enamel color by reducing the yellowness of the enamel. Neutral e-liquid has a lesser impact on tooth discoloration.

Scott Froum, DDS, and Alisa Neymark, DDS (2019) maintained that vaping causes enamel discoloration. The study found that enamel shade or color change was the same in vaping or smoking. The study set out to dispel the notion that vaping is safer to smoking by showing that they both have a similar impact on dental aesthetics (Scott Froum, DDS, and Alisa Neymark, DDS, 2019). E-cigarette vapor produces particles which are similar to those which are produced through smoking. The particles sediments and cause enamel staining. The study suggested that the tobacco heating system may accelerate the discoloration of teeth Zanetti, F., Zhao, X., Pan, J., Peitsch, M. C., Hoeng, J., & Ren, Y. (2019). Nevertheless, the study maintained that the rate of discoloration caused by vaping is a matter that should be investigated further.

E-cigarette use causes periodontal inflammation. Consistent vaping or use of e-cigarette can lead to inflammation of gingival epithelial cells. In recent times, studies have linked e-cigarette use with periodontal disease. Smoking has a similar impact on periodontal disease. The evidence suggests that vaping is no safer than smoking. The growing popularity of E-cigarette use may have a far reaching impact on oral health.

E-cigarette use causes carbonyl stress which causes inflammatory cytokine release in human periodontal ligament fibroblasts (Sundar, Javed, Romanos, & Rahman, 2017). According to Sundar (2017), e-cigarette use causes DNA damage as well. Oxidative stress causes pro-inflammatory responses. E-cigarette use causes the chronic inflammation of the supporting tissues of the teeth. Vaping stresses periodontal ligament cells which triggers and maintains inflammatory responses. Sundar (2017) argued that there are associations between e-cigarette use and the reduction of periodontal attachment levels. Although, studies have not linked e-cigarette use with tooth loss, it is a possibility if it causes the lowering of periodontal attachment levels.

Vaping involves the inhalation of nicotine which reduces blood flow in the mouth. Nicotine contains ultra-fine particles of toxic chemicals and heavy metals. The toxic particles affect both teeth and gums (Scott Froum, DDS, and Alisa Neymark, DDS, 2019). Lack of sufficient blood flow in the gums affects an individual's oral health. It means that teeth and gums do not get the nutrients and oxygen they need to remain healthy. Therefore, vaping causes the destruction of gum tissues which leads to gum recession. In severe cases, receding gums can cause tooth loss. They also increase the risk of tooth cavities and increases tooth sensitivity.

E-cigarettes have a unique capacity to deliver a nicotine laden aerosol to the lungs through inhalation. There are many variations in e-fluids. Some are flavored while others are neutral. The flavored e-liquid brands are extremely popular among young people. The recreational inhalation of e-cigarettes has grown significantly in the last five years. There is scanty literature on the health impacts on e-cigarettes. Nevertheless, there is no doubt that e-cigarettes causes periodontal diseases and dental staining.

Greater New York Dental Convention Experience

The Greater New York Dental Convention representative of the poster highlighted the importance of extensive dental research on e-cigarette use. The convention brought to light the inadequacy of the existing body of literature on e-cigarette use. E-cigarettes have only been around for a short while. Therefore, it is understandable that very little is known about the long-term consequences of vaping. Still, there are studies which have reliably linked e-cigarette use with periodontal disease.

The representative of the poster was providing with a new sense of responsibility in addressing the relationship between oral health and e-cigarettes. I was drawn by the pictures used for the poster, especially the graph, which shows how popular is e-cigarette becoming today. The representative was explaining why e-cigarette is popular among the youth and importance of educating the patients. She was clear in explanations and was answering on all the quest's questions. The representative, as a future hygienist, was very professional and knowledgeable. Hygienists have a responsibility to learn about their patient's smoking cessation as part of their routine dental practice. We learnt that dental check-ups can help to identify the impact of e-vaping on dental health.

The Greater New York Dental Convention was an important professional development opportunity. It brought together dental professionals and highlighted what is likely to become an important oral health problem in the future. As a result of the convention, dental professionals are prepared to address the oral health consequences of e-cigarette use. There is no doubt that vaping is going to be a serious dental health problem given its growing prevalence.

Conclusion

E-cigarettes were introduced in 2003 and have become extremely popular among the youth. In fact, vaping is replacing smoking because it is considered to be safer. There is growing evidence indicating that e-cigarette use has a serious impact on dental health. The study established that flavored e-liquids have an impact on tooth discoloration. Menthol and tobacco e-liquids alter tooth aesthetics through staining. Dental professionals can play an important role in reducing the impact of e-cigarettes by discussing smoking cessation as part of dental clinical practice. Perhaps people are more likely to avoid vaping if they get credible advice from their dentist.

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Effects of cigarette smoke and tobacco heating aerosol on color stability of dental enamel, dentin, and composite resin restorations.

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Composite Resins/*chemistry
Dental Enamel/*drug effects
Dentin/*drug effects
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Bicuspid ; Humans ; In Vitro Techniques ; Materials Testing ; Smoke ; Surface Properties

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Recent updates on electronic cigarette aerosol and inhaled nicotine effects on periodontal and pulmonary tissues.

Javed F¹, Kellesarian SV¹, Sundar IK², Romanos GE^{3,4}, Rahman I².

Author information

- 1 Department of General Dentistry, Eastman Institute for Oral Health, University of Rochester, Rochester, NY, USA.
- 2 Department of Environmental Medicine, University of Rochester Medical Center, Rochester, NY, USA.
- 3 Department of Periodontology, School of Dental Medicine, Stony Brook University, Stony Brook, NY, USA.
- 4 Department of Oral Surgery and Implant Dentistry, Johann Wolfgang Goethe University, Dental School, Frankfurt, Germany.

Abstract

E-cigarette-derived **inhaled nicotine** may contribute to the pathogenesis of **periodontal** and **pulmonary** diseases in particular via lung inflammation, injurious, and dysregulated repair responses. **Nicotine** is shown to have antiproliferative properties and affects fibroblasts in vitro, which may interfere in tissue myofibroblast differentiation in e-cig users. This will affect the ability to heal wounds by decreasing wound contraction. In periodontics, direct exposure to e-vapor has been shown to produce harmful **effects** in **periodontal** ligament and gingival fibroblasts in culture. This is due to the generation of reactive oxygen species/aldehydes/carbonyls from e-cig **aerosol**, leading to protein carbonylation of extracellular matrix and DNA adducts/damage. A limited number of studies regarding the **effects** of e-cig in oral and lung health are available. However, no reports are available to directly link the deleterious **effects** on e-cigs, **inhaled nicotine**, and flavorings **aerosol** on **periodontal** and **pulmonary** health in particular to identify the risk of oral diseases by e-cigarettes and **nicotine** aerosols. This mini-review summarizes the recent perspectives on e-cigarettes including **inhaled nicotine effects** on several pathophysiological events, such as oxidative stress, DNA damage, innate host response, inflammation, cellular senescence,

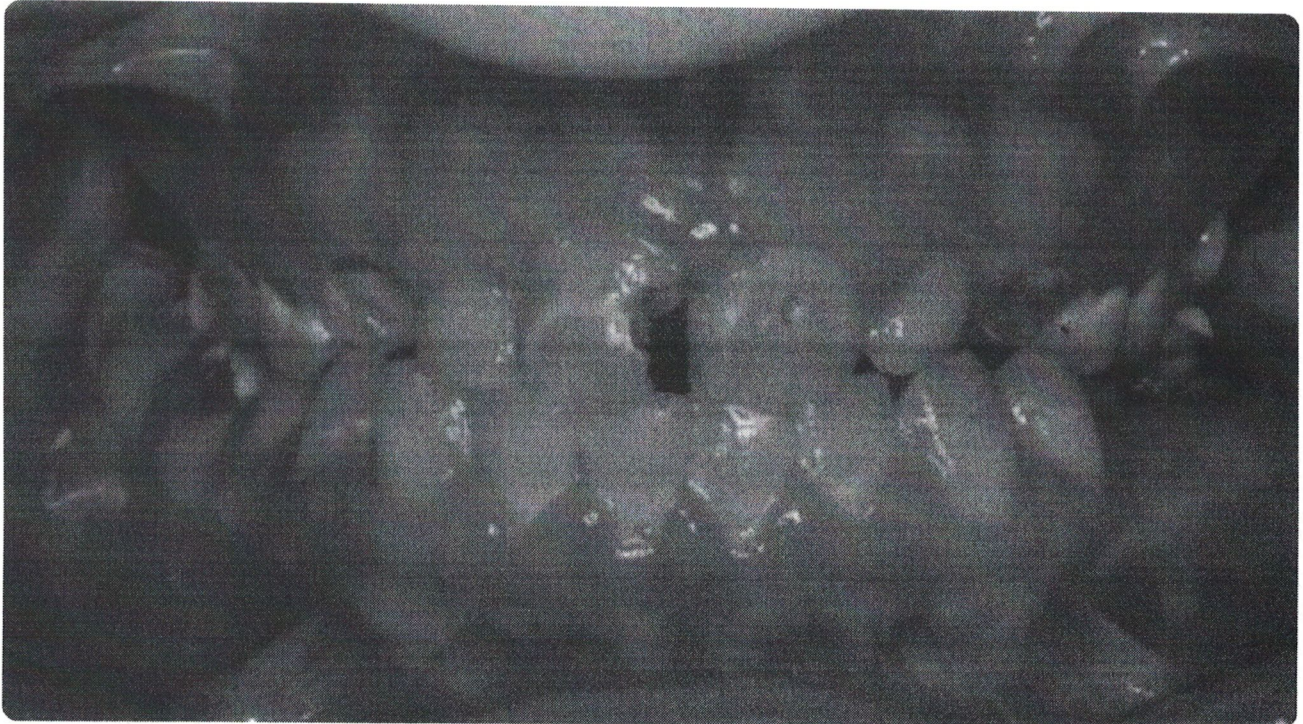
Vaping and oral health: It's worse than you think

Drs. Scott Froum and Alisa Neymark examine the effects of e-cigarette ingredients and their notable deterioration on oral health, as well as offer insight into how explosions while vaping and burn injuries from e-cigarettes can lead to disfigurement of



Author — Scott Froum, DDS, Alisa Neymark, DDS

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THE USE OF ELECTRONIC CIGARETTES (E-CIGARETTES) represents a significant and increasing proportion of tobacco consumption, posing a tremendous threat to oral health. This article will look at the following aspects of e-cigarettes:

- Overview of e-cigarette usage