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Original Article

Vaping Under the Microscope: Unpacking Iranian Dentists' Insights on Electronic Cigarettes and Their Impact on Oral Health

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Abstract

Background: Electronic cigarettes (e-cigarettes) have become significantly popular, especially among young people. E-cigarettes are a form of tobacco use in which the smoke produced by the vaporization of nicotine is inhaled. The increase in the consumption of these cigarettes causes many concerns about their long-term and unknown adverse effects on general and oral health. The present study was conducted to determine the level of awareness of dentists participating in the 15th Annual Scientific Congress of the Iranian General Dentists Association about e-cigarettes.

Methods: In this cross-sectional study, the dentists selected by convenience sampling were given a questionnaire including 14 awareness questions. After the participants completed it, the data were statistically analyzed using Pearson's correlation coefficient and an independent samples *t*-test.

Findings: A total of 347 dentists participated in the present study, and 36.9% stated that they had no familiarity with e-cigarettes. The answers of more than half of the participants to questions regarding the relative risk of using this type of smoking as a suitable method to quit other types of tobacco, long-term adverse effects on health, and the risk of explosion of these cigarettes were incorrect. The average score of awareness was 7.88 ± 3.25 out of a total of 14, indicating an overall moderate level of knowledge.

Conclusion: The average knowledge score related to the subject under investigation was moderate, and the knowledge in some aspects was not satisfactory.

Keywords: Knowledge, Dentists, Electronic cigarettes, Vaping

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Introduction

In the past decade, the consumption of a new form of tobacco, referred to as electronic cigarettes (e-cigarettes), has become popular worldwide.[1] Its makers claim it is a healthier alternative compared to the previous forms of tobacco consumption, and its function is based on vaporizing nicotine instead of burning it.[2] The perception of the complete safety of electronic cigarettes has caused the prevalence of worldwide consumption to increase among all age groups, especially among young people.[3] This increase in consumption has caused many concerns about the long-term and unknown adverse effects of consuming these types of cigarettes on human health.[4] Despite the lack of available scientific evidence related to the adverse effects, it has been shown that the inhalation of smoke from the evaporation of liquids in e-cigarettes causes inflammation in the respiratory tract and irreversible pathological changes in the lungs. Today, there are more than 7000 types of flavors on the market for e-cigarettes, which have very diverse compounds with nicotine concentrations ranging from zero to 36 mg/ml. The nicotine in an e-cigarette may be more than the nicotine in a pack of 20 cigarettes.[5] As the nicotine in e-cigarettes is extracted from the tobacco plant, the US Food and Drug Administration (FDA) has included these cigarettes in the category of tobacco and has emphasized that e-cigarettes should be included in smoking cessation programs. Different countries have adopted different policies regarding the free sale and consumption of e-cigarettes or their prohibition. In some countries, the consumption of e-cigarettes is prohibited[6] and in Iran, the Ministry of Health has not been willing to issue a label for these cigarettes. Although there is no definitive evidence of the oral and dental side effects of using electronic

cigarettes, dentists should not ignore the possibility of oral consequences due to the use of these cigarettes and should record their use in the patient's medical history.[1-3] Taking into account the rising trend of e-cigarette consumption in society, the possibility of dentists encountering patients using these cigarettes is also increasing. As the oral cavity is the primary site of direct exposure to the toxic constituents of all forms of tobacco, including e-cigarettes, these substances can potentially affect the teeth, periodontium, and oral mucosa. Therefore, dentists should have sufficient familiarity with this new category of tobacco use. Because no study has been conducted in Iran to measure the level of awareness about electronic cigarettes, this study aimed to measure the level of awareness among general dentists participating in the 15th Annual Scientific Congress of the Iranian General Dentists Association.

Materials and Methods

This cross-sectional study was conducted on general dentists participating in the 15th Annual Scientific Congress of the Iranian General Dentists Association. We used convenience sampling to collect the samples. Sampling was done by a final-year dental student presenting a questionnaire to the dentists. The collected information remained confidential until the end of the research, and the questionnaires were filled out anonymously. The research tool was a researcher-made questionnaire collected from similar studies and included individual and awareness-level questions.[5,7,8] The first section included demographic information such as age, gender, and time since graduation, as well as three yes/no questions assessing familiarity with electronic cigarettes, personal or acquaintance use, and use among the respondent's patients. The second part consists of 14 questions scored on the Likert scale, including "True," "False," and "Don't know." One point was assigned to each correct answer, and "I don't know" and wrong answers scored zero points. Therefore, the awareness score ranged between 0 and 14. Scores ranging from 0 to 4 were considered poor awareness, 5 to 9 average awareness, and 10 and above good awareness. The content validity of the questionnaire was confirmed by presenting it to ten experts and incorporating their feedback into the item revisions. Prior to the study, the questionnaire's reliability was evaluated among 30 general dentists. Test-retest reliability was assessed using the intraclass correlation coefficient (ICC), while internal consistency was measured via Cronbach's alpha. Both the ICC and Cronbach's alpha values were 0.75, demonstrating acceptable reliability and internal consistency of the instrument. The data collected by the operator was entered into the latest version of SPSS software and statistically analyzed using Pearson's correlation coefficient (two-tailed significance), *t*-test, and multivariate regression analysis. A significance level of $P=0.05$ was considered for the mentioned tests. The sample size was calculated based on previous similar studies to calculate the target sample size using the STATA 17 program. A regression test was used with an effect size of 0.1, a statistical power level of 0.8, 18 predictor variables, and a probability level of 0.05. This profile resulted in a total sample size of 340 people. This study was a research project approved by the Vice-Chancellor of Research and Technology of Kerman University of Medical Sciences, and by the ethics committee of this university with the number IR.KMU.REC.1402.277.

Results

A total of 347 dentists participated in the study, 54.17% of whom were female. The average age of the participants was 39.34 ± 26.11. The lowest recorded age was 24, and the highest was 83. The average time elapsed since the graduation of the participants in the study was 12.75 ± 10.08 years, with a maximum-minimum interval of 0–47 years. Of the respondents, 36.9% stated that they were not familiar with e-cigarettes, 20.17% used e-cigarettes, and 60.5% said that they had encountered cases of consumption of these types of cigarettes among their acquaintances or patients. Table 1 presents the frequency and percentage distribution of the responses to 14 questions measuring their knowledge about e-cigarettes (Table 1).

As can be seen, the answers of more than half of the participants to questions 1, 5, 10, and 14 were "I don't know" or wrong, and the most "I don't know" or wrong answers belonged to items 1 and 10. The highest percentage of correct answers was given to questions 2, 8, and 9, and the highest percentage belonged to item 2. The average knowledge score of the studied subjects was 7.88 ± 3.25, the lowest score was 0, and the highest score was 13. In Figure 1, the placement of the total score of the participants' awareness level is shown in three categories: weak, average, and good. The highest proportion of participants had an average level of awareness.

The independent samples test showed that there was a significant relationship between the respondents' familiarity with e-cigarettes and their level of knowledge about them ($P=0.0001$). Also, there was a significant relationship between the consumption of electronic cigarettes by acquaintances and patients with the level of awareness of the respondents ($P=0.0001$). The Pearson correlation coefficient (two-tailed significance) showed that there was a significant inverse relationship between participants' knowledge of e-cigarettes and the two items of age ($P=0.002$) and the time since their graduation ($P=0.003$). This means dentists with fewer years of professional experience and those who had graduated more recently exhibited significantly higher levels of awareness.

Table1. Frequency and percentage distribution of the responses of the participants in the present research

Questions	The number and percentage of "I don't know" and wrong answers.	The number and percentage of correct answers
1- The risk of using e-cigarettes to human health is lower than that of regular cigarettes.	Number: 253 Percentage: 72.91%	Number: 94 Percentage: 27.08%
2- E-cigarettes are entirely harmless to human health.	Number: 65 Percentage: 18.7%	Number: 282 Percentage: 81.3%
3- There is no risk of cancer from using e-cigarettes.	Number: 126 Percentage: 36.31%	Number: 221 Percentage: 63.68%
4- Smoking e-cigarettes may make a person inclined to use other types of tobacco in the future.	Number: 156 Percentage: 44.95%	Number: 191 Percentage: 55.04%
5- Using e-cigarettes is a good way to quit other types of smoking.	Number: 183 Percentage: 52.73%	Number: 164 Percentage: 47.26%
6- E-cigarette smoke in closed spaces is harmful to the health of others.	Number: 156 Percentage: 44.95%	Number: 191 Percentage: 55.04%
7- Most e-cigarettes contain some nicotine.	Number: 129 Percentage: 37.17%	Number: 218 Percentage: 62.18%
8- Smoking e-cigarettes is harmful to pregnant women and fetuses.	Number: 97 Percentage: 27.95%	Number: 250 Percentage: 72.04%
9- Smoking e-cigarettes can lead to addiction.	Number: 99 Percentage: 28.53%	Number: 241 Percentage: 71.46%
10- The long-term adverse effects of e-cigarette smoking on human health have been identified.	Number: 259 Percentage:74.63%	Number: 88 Percentage: 25.36%
11- Smoking e-cigarettes can damage the teeth.	Number: 147 Percentage: 42.36%	Number:200 Percentage: 57.63%
12- Smoking e-cigarettes can lead to gum disease.	Number: 133 Percentage: 38.32%	Number: 214 Percentage: 61.67%
13- Smoking e-cigarettes can lead to dry mouth.	Number: 125 Percentage: 36.02%	Number: 222 Percentage: 63.07%
14- Smoking e-cigarettes carries the risk of electric shock and battery explosion.	Number: 213 Percentage: 61.38%	Number:134 Percentage: 38.61%

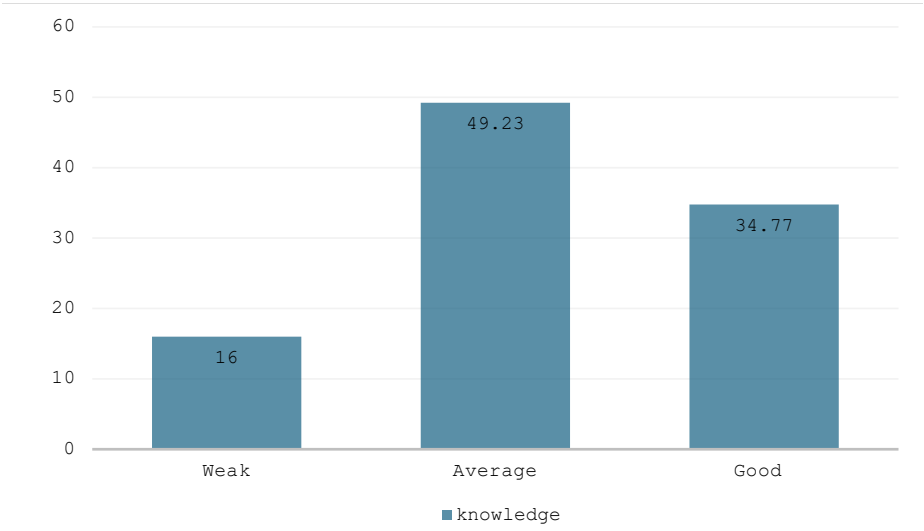

Figure 1. Placement of the participants' total awareness score in three categories: weak, average, and good

Discussion

The present research was conducted to determine the knowledge levels of Iranian dentists about e-cigarettes, and its results showed that although the average expertise score of dentists participating in the study was moderate, their awareness of some aspects related to e-cigarettes was not acceptable. The results are largely consistent with the results of three similar studies by Almutham et al Alhajj et al and Fang et al.[9-11] In the conclusion of the three studies, it was mentioned that the knowledge level of the participants (general, medical, and dental students) was weak. However, no study has been done to measure the level of awareness of dentists about e-cigarettes, and it seems that the present study is the first of this kind. The study conducted by Alhajj et al which used dental students as participants, revealed that the knowledge of dental students about e-cigarette was unsatisfactory, yet their beliefs and attitudes were acceptable.[10] However, e-cigarettes are relatively new. The level of awareness of the general population about them is not yet expected to be high, but the members of the medical staff should have an acceptable level of knowledge in this field due to their

encounter with patients who consume e-cigarettes and because of their duty to prevent their harmful effects. Alsanea et al showed that medical students' awareness level was higher compared to students of other fields, including dentistry.[8] Considering the numerous possible adverse effects of e-cigarettes on oral health, it seems that dental students and dentists should have as much information in this field as medical students and doctors. The average age of the respondents in the present study (39 years) was higher than in other studies, which can be attributed to the fact that similar studies have been conducted on high school students and college students. Researchers like Gupta et al and Sanders-Jackson et al also believed that teenagers and young people are more prone to using e-cigarettes, and for the same reason, in the research conducted by them, "young age groups" have been deliberately selected for measurement.[12,13] Sabbagh et al and Doherty et al have measured the level of parents' awareness about this topic, which is why the average age of their subjects was naturally higher than that of the subjects in the present study.[14,15] The number of incorrect answers for questions 1, 5, 10, and 14 of the questionnaire used in the current research was significant, with more than half of the respondents (up to 74%) unable to answer the questions correctly. It is stated in question 1 that "E-cigarettes are less dangerous to health than regular cigarettes." According to the available evidence, this statement is correct. In the research conducted by Alhajj et al on dental students, only 33.1% of the studied people stated that the risk of e-cigarettes is lower than regular cigarettes, which is almost similar to the results of the present research (27.08%).[10] It is expected that the knowledge of doctors and dentists in this category should be at a level where they can correctly answer the questions raised by their patients and provide correct guidance in this area. Due to the freshness of the subject, the relevant material has not yet been included in the reference books, and some studies have shown that the dominant source of information on e-cigarettes, both for doctors, dentists, and the general public, is social media, Google, etc. This issue has negative effects on their level of awareness.[10,12,16] In question 5, it is stated that "Using e-cigarettes is considered a suitable way to quit other types of smoking. While recent literature disputes this assertion, studies by Stein et al and Tamimi et al suggest that electronic cigarettes may serve as a smoking cessation tool. Therefore, we need further investigation to clarify this matter.[17,18] In the studies conducted by Almutham et al and Alhajj et al 23.3 % and 31.6% of the respondents considered e-cigarettes as a help to quit regular cigarettes, respectively, which is lower than the findings of the current research. However, in the study of Aghar et al 48.6% of the respondents expressed that e-cigarettes are beneficial for quitting smoking, which is closer to the findings of the present study (52.7%). It should be noted that their assessment was on the general population rather than on medical staff.[9,10,19] Question 10 of the current research questionnaire stated "The long-term adverse effects of e-cigarette consumption on human health have been identified", which, as described in detail earlier, is not correct. This question has not been raised in similar research and has been included in the present research questionnaire to emphasize the fact that more time and cohort studies are necessary for accurate knowledge of the effects of e-cigarette abuse on public health and oral health. Previous questionnaires that have been used so far to measure the level of awareness have been quite heterogeneous in terms of the number and content of the questions; for example, Fang et al have only asked four questions to measure the level of awareness. However, the number of questions of Alhajj et al was almost similar to the number of questions asked in the present research. They asked questions such as "Do e-cigarettes have FDA approval?" or "Is e-cigarette consumption dangerous for the people around the user?" In the current study, these specific items were not utilized to assess awareness levels. However, certain items from their research—such as 'the health risks of e-cigarette use,' 'e-cigarettes are less harmful than conventional cigarettes,' and 'e-cigarettes can effectively aid in quitting other tobacco products'—closely aligned with the items employed in our investigation.[10,11] In this study, the reason for raising question number 14, whose score was also not acceptable (61%), was simply because of the recent publication of case report articles in which the danger of explosion of electronic cigarettes and serious physical injuries caused by this explosion were mentioned.[20,21] In this survey, three questions (numbers 11 to 13) were assigned to the oral manifestations of these cigarettes (caries, periodontal disease, and dry mouth). The correct answer rates for these three questions were higher than 50%. At the same time, in the only study similar to ours, Martell et al stated that the people who answered the questions did not have enough knowledge in this field.[22] In the field of oral health, the evidence available is mostly related to the periodontal effects of e-cigarette consumption, which has been evaluated in various studies by measuring periodontal health indicators, bleeding from the gums, or tooth loss. In a review, Wasfi et al report that there is a significant increase in inflammation in the gums of daily users of e-cigarettes compared to non-users and aerosols caused by the use of electronic cigarettes lead to an increase in inflammation of the gums.[23] There is not as much evidence regarding the exacerbation of dental caries following the use of e-cigarettes as there is on the effect on periodontal tissue. In some laboratory studies, it has been hypothesized that the compounds used for viscosity and sweet flavoring in the liquids in e-cigarettes are potentially carcinogenic. Propylene glycol, which is one of the main components of this liquid, creates acetic acid, lactic acid, and

propionaldehyde in the process of evaporation, all of which intensify the formation of cavities. Also, the vegetable glycerin in this liquid doubles the formation of plaque biofilm and quadruples the adhesion of bacteria to dental surfaces.[6,24,25] We did not ask about the most common source of information about e-cigarettes, which can be seen as a limitation of the current research.[26] Future research should account for this factor, as social media has become a primary source of information across numerous domains, despite its well-documented risk of disseminating non-scientific content. Liu et al demonstrated that Twitter content has propagated misinformation in this field, particularly regarding readers' inaccurate perceptions of toxin presence in e-cigarette vapor. This misinformation may contribute to higher e-cigarette adoption rates, ultimately driving increased population-level usage.[26]

Conclusion

The results of the present research showed that although the average level of knowledge of dentists about electronic cigarettes is moderate, their knowledge in some areas of the subject is not sufficient. Considering the important effects of these cigarettes on oral and dental health, dentists must become more familiar with these effects. Therefore, some suggestions to achieve this goal are: 1- Including the discussion of electronic cigarettes and their oral effects in the curriculum of general and specialized dentistry courses. 2- Holding training courses on the effects of smoking on oral health with emphasis on new forms of smoking. 3- Conducting interventional studies in this area and providing training (for example, using pamphlets) to dentists, and then evaluating them to measure the improvement of their awareness in this field. 4- Making a standard questionnaire for measuring dentists' awareness of the effects of tobacco use (including e-cigarettes) on oral health, enabling consistent cross-study comparisons and reducing data inconsistencies."

Authors' Contribution

Conceptualization: Nader Navabi.
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Investigation: Ali Razavi.
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Competing Interests

The authors declare no conflict of interest.

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References

1. de Fatima Soares Garcia B, de Barros Nascimento B, Marques EF, de Jesus CB, Santana Neto IC, Rocha LS, et al. The use of electronic cigarettes and other tobacco products among university students and their potential relationship with oral health: a cross-sectional study. J Am Dent Assoc. 2024;155(8):647-56. doi: 10.1016/j.adaj.2024.04.012.
2. Iacob AM, Escobedo Martínez MF, Barbeito Castro E, Junquera Olay S, Olay García S, Junquera Gutiérrez LM. Effects of vape use on oral health: a review of the literature. Medicina (Kaunas). 2024;60(3):365. doi: 10.3390/medicina60030365.
3. Singh T, Arrazola RA, Corey CG, Husten CG, Neff LJ, Homa DM, et al. Tobacco use among middle and high school students--United States, 2011-2015. MMWR Morb Mortal Wkly Rep. 2016;65(14):361-7. doi: 10.15585/mmwr.mm6514a1.
4. Rennie LJ, Bazillier-Bruneau C, Rouëssé J. Harm reduction or harm introduction? Prevalence and correlates of e-cigarette use among French adolescents. J Adolesc Health. 2016;58(4):440-5. doi: 10.1016/j.jadohealth.2015.12.013.
5. Allen JG, Flanigan SS, LeBlanc M, Vallarino J, MacNaughton P, Stewart JH, et al. Flavoring chemicals in e-cigarettes: diacetyl, 2,3-pentanedione, and acetoin in a sample of 51 products, including fruit-, candy-, and cocktail-flavored e-cigarettes. Environ Health Perspect. 2016;124(6):733-9. doi: 10.1289/ehp.1510185.
6. Ramôa CP, Eissenberg T, Sahingur SE. Increasing popularity of waterpipe tobacco smoking and electronic cigarette use: implications for oral healthcare. J Periodontal Res. 2017;52(5):813-23. doi: 10.1111/jre.12458.
7. Geletko KW, Myers K, Brownstein N, Jameson B, Lopez D, Sharpe A, et al. Medical residents' and practicing physicians' e-cigarette knowledge and patient screening activities: do they differ? Health Serv Res Manag Epidemiol. 2016;3:2333392816678493. doi: 10.1177/2333392816678493.
8. Alsanea S, Alrabiah Z, Samreen S, Syed W, Bin Khunayn RM, Al-Arifi NM, et al. Prevalence, knowledge and attitude toward electronic cigarette use among male health colleges students in Saudi Arabia-a cross-sectional study. Front Public Health. 2022;10:827089. doi: 10.3389/fpubh.2022.827089.
9. Almutham A, Altami M, Sharaf F, AlAraj A. E-cigarette use among medical students at Qassim University: knowledge, perception, and prevalence. J Family Med Prim Care. 2019;8(9):2921-6. doi: 10.4103/jfmpc.jfmpc_567_19.
10. Alhajj MN, Al-Maweri SA, Folayan MO, Halboub E, Khader Y, Omar R, et al. Knowledge, beliefs, attitude, and practices of e-cigarette use among dental students: a multinational survey. PLoS One. 2022;17(10):e0276191. doi: 10.1371/journal.pone.0276191.
11. Fang J, Ren J, Ren L, Max W, Yao T, Zhao F. Electronic cigarette knowledge, attitudes and use among students at a university in Hangzhou, China. Tob Induc Dis. 2022;20:09. doi: 10.18332/tid/144230.
12. Gupta V, Sharma M, Srikant N, Manaktala N. Assessment of knowledge of use of electronic cigarette and its harmful effects among young adults. Open Med (Wars). 2020;15(1):796-804. doi: 10.1515/med-2020-0224.
13. Sanders-Jackson AN, Tan AS, Bigman CA, Henriksen L. Knowledge about e-cigarette constituents and regulation: results from a national survey of US young adults. Nicotine Tob Res. 2015;17(10):1247-54. doi: 10.1093/ntr/ntu276.
14. Sabbagh HJ, Khogeer LN, Hassan MHA, Allaf HK. Parental

knowledge and attitude regarding e-cigarette use in Saudi Arabia and the effect of parental smoking: a cross-sectional study. Risk Manag Healthc Policy. 2020;13:1195-205. doi: 10.2147/rmhp.S253749.
15. Doherty J, Davison J, McLaughlin M, Giles M, Dunwoody L, McDowell C, et al. Prevalence, knowledge and factors associated with e-cigarette use among parents of secondary school children. Public Health Pract (Oxf). 2022;4:100334. doi: 10.1016/j.puhip.2022.100334.
16. McLeish AC, Hart JL, Walker KL. College student e-cigarette users' knowledge about e-cigarettes: ingredients, health risks, device modifications, and information sources. Int J Environ Res Public Health. 2022;19(4):1962. doi: 10.3390/ijerph19041962.
17. Stein MD, Caviness CM, Grimone K, Audet D, Borges A, Anderson BJ. E-cigarette knowledge, attitudes, and use in opioid dependent smokers. J Subst Abuse Treat. 2015;52:73-7. doi: 10.1016/j.jsat.2014.11.002.
18. Tamimi N. Knowledge, attitudes and beliefs towards e-cigarettes among e-cigarette users and stop smoking advisors in South East England: a qualitative study. Prim Health Care Res Dev. 2018;19(2):189-96. doi: 10.1017/s1463423617000445.
19. Aghar H, El-Khoury N, Reda M, Hamadeh W, Krayem H, Mansour M, et al. Knowledge and attitudes towards e-cigarette use in Lebanon and their associated factors. BMC Public Health. 2020;20(1):278. doi: 10.1186/s12889-020-8381-x.
20. Tran V, Mian M, Sreedharan S, Robertson R, Saha A, Tadakamadla SK, et al. Oral and maxillofacial injuries associated with e-cigarette explosions: a systematic review and management guidelines proposal. J Oral Maxillofac Surg. 2023;81(5):583-92. doi: 10.1016/j.joms.2023.01.009.
21. Dekhou A, Oska N, Partiali B, Johnson J, Chung MT, Folbe A. E-cigarette burns and explosions: what are the patterns of oromaxillofacial injury? J Oral Maxillofac Surg. 2021;79(8):1723-30. doi: 10.1016/j.joms.2021.03.008.
22. Martell KM, Boyd LD, Giblin-Scanlon LJ, Vineyard J. Knowledge, attitudes, and practices of young adults regarding the impact of electronic cigarette use on oral health. J Am Dent Assoc. 2020;151(12):903-11. doi: 10.1016/j.adaj.2020.08.002.
23. Wasfi RA, Bang F, de Groh M, Champagne A, Han A, Lang JJ, et al. Chronic health effects associated with electronic cigarette use: a systematic review. Front Public Health. 2022;10:959622. doi: 10.3389/fpubh.2022.959622.
24. Almeida-da-Silva CLC, Matshik Dakafay H, O'Brien K, Montierth D, Xiao N, Ojcius DM. Effects of electronic cigarette aerosol exposure on oral and systemic health. Biomed J. 2021;44(3):252-9. doi: 10.1016/j.bj.2020.07.003.
25. Yang I, Sandeep S, Rodriguez J. The oral health impact of electronic cigarette use: a systematic review. Crit Rev Toxicol. 2020;50(2):97-127. doi: 10.1080/10408444.2020.1713726.
26. Liu J, Wright C, Elizarova O, Dahne J, Bian J, Williams P, et al. Effects of brief exposure to misinformation about e-cigarette harms on Twitter on knowledge and perceptions of e-cigarettes. Digit Health. 2022;8:20552076221116780. doi: 10.1177/20552076221116780.