وزارة التعليم العالي والبحث العلمي
جامعة ميسان
كلية التربية الاساسية

مجلة ميسان للدراسات الاكاديمية

العلوم الانسانية والاجتماعية والتطبيقية

ISSN (Paper)- 1994-697X
(Online)- 2706-722X

المجلد (23) العدد (50) حزيران (2024)

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رقم الايداع في دار الكتب والوثائق بغداد 1326 في 2009

Misan Journal for Academic studies
مجلة ميسان للدراسات الاكاديمية
Vol 23 Issue 50 June 2024
مجلد 23 العدد 50 حزيران 2024

ISSN (Paper) 1994-697X

ISSN (Online) 2706-722X

DOI: https://doi.org/10.54633/2333-023-050-010

Effect of Electronic Cigarette on Oral Health

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Abstract:

A vape, often known as an electronic cigarette, is a device that mimics tobacco use. The most popular tobacco products used by youth are electronic cigarettes and vape pens, in this research suggested that flavored liquid of electronic cigarettes have a negative effect on teeth and may cause other oral health problems. The e-cigarette has gained popularity all around the world since its release in 2003, most frequently in young individuals (18–25 years old). The term "smoking" gave rise to the term "vaping," which describes breathing an aerosolized "e-liquid" that has been evaporated without burning thanks to a small electronic vaporizer device. The aim of this study is to describe electronic cigarettes and their components, as well as to highlight the hazards of e-cigarette smoking on human health, regarding their safety; their impact on smoking initiation and smoking cessation; and regulatory issues related to their use. The scientific databases Scopus, Google Scholar, PubMed, and Web of Science can be searched using relevant keywords to find relevant papers. In conclusion electronic cigarette have an impact on oral and general health.

Keywords: electronic cigarette, vape, E-liquid components, E.C generation, tobacco product, nicotine.

Introduction:

Electronic cigarettes (ECs), which were first designed to be a less harmful option to conventional smoking , usually have tank atomizer to hold EC-liquid and a battery to exert control the device so that the E-liquid may be vaporized (1). Using electronic cigarettes , or "e-cigarettes," has greatly expanded in popularity (2). They are offered directly to customers and are made to resemble traditional cigarettes in both appearance and feel. Most of the products are marketed as being less costly and free of

nicotine substitutes for traditional cigarettes that can be used in areas that are normally off-limits to smoking because they are exempt from standard smoking rules. The US Food and Drug Administration (FDA) doesn't permit electronic cigarettes to be advertised for therapeutic purposes, like quitting smoking, even though it allows them to be sold under the umbrella of tobacco products rather than as medications or devices (3). Electronic cigarettes liquids containing nicotine which lead to addiction, nicotine may prolong the duration of time that ECs are used in a day(4) (5). Since e-cigarettes went on sale in 2003 or thereabouts, their use has increased dramatically (6). Around 7 million adult users of e-cigarettes were reported worldwide in 2011, compared to 1.1 billion cigarette smokers; by 2020, that number had risen to 68 million. The number of people using e-cigarettes increased to 82 million in 2021 (7).

Material and Methods:

Search for literature and the selection standards in the scientific databases Scopus, Google Scholar, PubMed, and Web of Science, pertinent papers would be searched using keywords such as "electronic cigarette, vape, E-liquid components, E.C generation, tobacco product, nicotine "

Electronic cigarettes generations:

E-cigarette designs are categorized by generation as they have changed throughout time. Vape pens, e-cigarettes, and e-cigs are more common names for electronic cigarettes. ENDS, or electronic nicotine delivery systems, comprise variety of devices such as vaporizers, e-pens, pipes, hookahs, and vape pens. ECs come in four generations (8)(9) which include:

1. First generation (the cigarette-like).
2. Second generation (clearomizer).
3. Third generation (mod).
4. Fourth generation (pod).

First-generation ECs were called "cig-a-likes" because they were made to resemble traditional cigarettes in both appearance and feel. They have fixed, low-voltage batteries. Three models comprise the first generation of atomizing units that resemble cigarettes (10); The 1-piece disposable EC was developed by manufacturers in 2013 with the intention of being thrown away after only one usage. (11). With the exception of the disposable devices, the 2- and 3-piece ECs that resemble cigarettes have rechargeable batteries and fluid reservoirs with a minimal volume that are prefilled and frequently not intended to be filled again. Customers can buy empty reservoirs for certain brands of 2-piece ECs and fill them by themselves.

Second-generation ECs, referred to as "clearomizers," frequently using Larger batteries with variable voltage, sometimes referred to as pen-style batteries (12) (13). The atomizing unit of second-generation clearomizers is detachable, has a filament and is housed inside a shell that inserts into the battery and the fluid reservoir. Clearomizers have bigger fluid reservoirs and are translucent as compared to ECs that resemble cigarettes (or tanks). Currently available refill fluids can be used to fill clearomizers.

Third-generation ECs are referred to as "Mods," and they consist of customized batteries with adjustable voltage, wattage, and power. Additional features, such the capacity to recharge a smartphone, are also included in some models (14).

Fourth-generation of ECs consist of the pod-style, has a set voltage and several battery designs, like USB or teardrop shapes (15). Fourth-generation ECs, or pods, are emerging quickly since this generation is also full of newcomers, make up a major portion of the market for ECs (9), features an atomizer/mouthpiece, an EC liquid reservoir, and comparatively low-powered batteries. Pods come in three varieties: disposable, refillable (open system), and prefilled (closed system) (15).

Composition of electronic cigarettes liquid and aerosol:

Evaluating the chemicals contained in e-liquids and aerosols is a crucial initial step toward determining the impact of e-cigarettes on human health (16). Comprehensive evaluation of e-liquid components has proven challenging due to e-liquid unpredictability. The amounts stated on product labels may not match the actual quantity of ingredients present in e-liquids (17). Investigations indicate that e-liquids can undergo chemical change, although it is unclear if mixing unknown substances with solvents results in the generation of new products (18)(19). Furthermore, the aerosolization of e-liquid can produce additional substances the user inhales. Aerosols and e-liquids contains a variety of undisclosed chemicals. ingredients. It is unclear if these compounds are introduced in the course of manufacture, after being combined with other ingredients, or in a different way. The effects of breathing these chemicals are yet unknown, despite the fact that some of them have been deemed safe for consumption. Such chemicals should be further evaluated for toxicity as inhalation validates their classification as a separate route of exposure (16). The cartridge normally contains a liquid formed of propylene glycol and/or vegetable glycerin, a sweetener and water. Depending on the liquid's sweeteners and tastes, the resulting aerosol may contain metals like nickel, chromium, or lead, as well as acetaldehyde, formaldehyde, acrolein, and reactive oxygen compounds (20). The most common flavors in electronic cigarettes are tobacco, mint, chocolate, and a variety of fruits. There are currently over 8,000 different compounds that are employed as tastes and scents in electronic cigarettes around the world. ECs that come in flavors such as caramel, strawberry, and jelly candies are also sold in order to satisfy the widest possible range of individual preferences. The safety of these flavoring compounds in humans has only been evaluated for a very small number of them. Compared to those present in tobacco smoke, these contaminants are usually detected in much less amounts in the EC aerosol; however, under specific operating conditions, they may be found in concentrations that are Compared to tobacco smoke, these contaminants are typically present in the EC aerosol at significantly lower concentrations (20). On the other hand, it was revealed that ECs included higher concentrations of nickel and formaldehyde, which are similar to the amounts of lead and chromium found in tobacco cigarettes (21). Certain samples have a nicotine concentration that does not correspond to the amount that is specified on the label of the cartridge fluid (22). The amount of nicotine that was present in each puff during the simulated usage of electronic cigarettes ranged from 0 to 35 micrograms, depending on the type (22)(8).

Effect of electronic cigarettes on the general health:

As a result of numerous methodological issues, the relatively small number of researches, the Contradictions and inconsistencies in the findings, moreover, there are no lasting effects, it is not possible to arrive at definitive conclusions regarding the safety of ECs. A total of 76 research studies have concluded that ECs are not safe, even though they are likely less hazardous than CCs. For smokers who are reluctant to stop, the "harm reduction" approach could be helpful, but it is likely that ex-smokers and people who have never smoked may be at greater risk when using electronic cigarettes. Because of their relatively fragile nature, the lungs are susceptible to suffering considerable harm from even the most modest inflammation (23). When people were exposed to electronic cigarettes, it was found that their lungs secreted proinflammatory cytokines like interleukin IL-6, IL-8, and tumor necrosis factor-α (TNF-α), as indicated by a number of studies (24)(25). A number of lung inflammatory disorders, including severe respiratory distress, have been linked to the use of electronic cigarettes, according to reports (26), lipoid pneumonia (27),organizing pneumonia, respiratory bronchiolitis-associated interstitial lung disease (28), diffuse alveolar hemorrhage(27) and hypersensitivity pneumonitis (29). Remarkably, those who used electronic cigarettes had an increased chance of contracting COVID-19, or coronavirus diseases (30), and increased risk of COVID-19 death (31) as opposed to non-smokers.

Adolescent brain development can be negatively impacted by nicotine exposure from traditional or electronic cigarettes (32). It is acknowledged that using e-cigarettes are extremely risky to the behavioral health of adolescents (33). Whatever the kind, using tobacco products is almost usually initiated and established throughout adolescence, when the developing brain is most susceptible to being addicted to nicotine (34)

Short-term vaping was linked to an elevated heart rate, according to some research on EC smokers (35)(36), a drop in oxygen saturation and an increase in diastolic blood pressure (37). No rise in heart rate was observed in other investigations (38)(39) or a rise in oxygen saturation in the blood (38). In EC smokers, both active and passive vaping had no effect on the total blood count (40). A minor increase in diastolic blood pressure without causing a shift in heart activity was observed in research with seasoned EC users. As a result, those who smoke electronic cigarettes are more likely to atherosclerosis, hypertension, arrhythmia, myocardial infarction, and heart failure. These hazards are expected to rise, especially for the young people who are increasingly using e-cigarettes, particularly those with flavored additives (39).

So the health concerns associated with using electronic cigarettes have not yet been established, nor has the safety of these devices been proven by science. The majority of EC safety problems are brought on by insufficient regulation and uneven quality control. The components, nicotine delivery level, and EC cartridge quality differ greatly between companies because to the absence of oversight and regulation. As a result, EC users are unable to determine the precise makeup of the product they are using (41).

Effect of electronic cigarettes on oral health:

Specialists of oral health have observed that users of e-cigarettes have worse peri-implant loss of bone, radiographic bone density, probing depth, clinical attachment loss, and periodontal and peri-implant clinical and parameters for radiography. Nonsmokers showed more bleeding upon probing than did smokers of conventional cigarettes and users of electronic cigarettes (42). Because nicotine affects melanocytes that are found along basal cells, smoking e-cigarettes causes an increase in melanin pigmentation in the oral mucosa (43). E.C impaired neutrophil function and local vasoconstriction impede the oral mucosa's ability to repair wounds (44). E-cigarettes can cause discoloration of teeth, also called staining (45). Nicotine increases the body's susceptibility to dangerous microorganisms in the mouth by decreasing salivary flow (46). Dental caries and halitosis (bad breath) are thus caused by a dry mouth and increased oral bacteria (47). Excessive nicotine intake has been demonstrated to have harmful effects on osteoblasts, antiproliferative properties, and an impact on bone metabolism (48). Nicotine has been linked to decreased leukocyte production and healing because it prevents the development of osteoblasts and neovascularization(49).

Effect of Electronic cigarettes smoking on dental caries and tooth structure:

One of the most prevalent dental health issues that individuals now face worldwide is dental caries (50). It is a chronic infectious disease associated with the interplay of behavioral, biological, and socioeconomic factors (51). The term "dental caries" refers to both the condition and the resulting lesion (52)(53). It is brought on by the acidic byproducts of food carbohydrates fermented by bacteria, especially sucrose, which break down the hard acellular tissue in teeth (54). Dental caries develops gradually and is caused by a complex process that is triggered by cariogenic bacteria populating the surface of teeth. Dental caries is primarily caused by an ecological imbalance between oral biofilms, which are defined by dental minerals and microbial activity (55). Bacterial acid production, salivary buffering, and the surrounding tooth structure cause variation in plaque ph. The conditions for inducing dental caries include a significant pH decrease in the presence of a sugar substrate (56).

Since the aerosol from electronic cigarettes comes into direct interaction with the teeth, it may cause a detrimental effect on tooth structure and the tissue that supports teeth (57). When looking at the connection between specific mouth symptoms and teen e-cigarette use, it was shown that vaping greatly raised the likelihood of tooth damage. In fact, gingival discomfort was self-reported by 18.5% of e-cigarette users, and/or bleeding, 11.4 percent of users self-reported having a tooth fraction in the preceding 12 months, and 11% reported tongue soreness with or without inside cheek pain. There is in vitro research to back up these observations (45). conducted on sample of bovine enamel subjected to e-cigarette aerosols using flavors liquid (menthol, tobacco and neutral) and different amounts of nicotine concentration (0, 12, and 18 mg). the investigation showed that flavored liquids produced a larger color change than aerosols with different nicotine levels and tastes, which also decreased brightness. These results imply that the structure and aesthetics of teeth are negatively impacted by e-cigarettes (58). Enamel demineralization is accelerated when sweet materials in electronic liquid base, such as glycerin and propylene glycol, break down into byproducts including propionaldehyde, lactic acid, and acetic acid (60). Additionally, nicotine and EC aerosol stimulate Streptococcus mutans's

adherence on the enamel's surface and encourage xerostomia (61)(60). Increased levels of cariogenic carbohydrates like fructose and sucrose are present in certain e-liquids (61)(62)(63). In particular, pit and fissure caries, are made more likely to progress due to these circumstances (60). Another study found that using e-cigarettes increased S. mutans proliferation, mostly during the phase of early culture. This was validated by a rise in biofilm mass after six exposures to nicotine-rich e-cigarettes, from 8 ± 0.5 mg with the control to 47 ± 5 mg. More easily, S. mutans cells from e-cigarettes adhered to exposed teeth. The prevalence of e-cigarettes rose the way in which pathogenic genes and the proliferation of S. mutans by increasing the manifestation of competence, glucan-binding genes, and glucosyltransferase. The use of electronic cigarettes promoted the development of biofilms and their adhesion to teeth surfaces (64). Aerosolized electronic cigarettes increased microbial adherence to enamel four times. In comparison to unflavored controls, enamel hardness was reduced by up to 27% and biofilm development increased twofold after exposure to flavored aerosols. Ethyl maltol, a sugar alcohol, inhibited the development and adhesion of S. mutans. while enamel demineralization caused by microorganisms was consistently associated with e-liquid esters (triacetin, hexyl acetate, and ethyl butyrate). Because of the e-viscosity, liquid's S. mutans was able to stick to cracks and pits (61). According to the included studies, the sugars and tastes in e-liquids increased the incidence of dental caries. Through a variety of methods, the users' oral inhalation of the heated e-liquid aerosol contributed to dental caries.

Electronic cigarettes smoking and periodontal diseases:

The specialized tissues that support and surround teeth, keeping them in the maxillary and mandibular bones, are called the periodontium (65). It is made up of four main parts: the alveolar bone, the periodontal ligament, the gingiva, and the cementum (66). Interactions between the bacteria in tooth plaque and the human immune system's response to this bacterial infection in the tissues surrounding the teeth are among the many variables that lead to the development of periodontal disorders (67). Periodontitis is the main cause of adult tooth loss because it erodes connective tissue and bone support(68)(69). Apart from the harmful microorganisms in the biofilm, tobacco-related, environmental, and genetic variables also contribute to the development of periodontal disorders (70)(71). The oral health of people who use e-cigarettes, smoke cigarettes, and don't smoke was assessed using varying periodontal parameters in the investigated research, for example, Cho demonstrated that the odds ratios for both e-cigarette users and non-users were equivalent or comparable (72), In contrast, another study indicated that those who used electronic cigarettes had a higher chance of developing gingival disease (73). Using a measure known as the gingival bleeding index, which was higher in e-cigarette users than in non-smokers, another study demonstrated similar findings (73). Löe and Silness reported that the gingival index was measured in the same study and showed that smokers had the highest gingival index, those who don't smoke and those who use e-cigarettes came next. There was a discernible difference in every case, whether it was smokers against non-smokers or smokers versus e-cigarette users. (73). Five investigations examined bleeding on probing (BoP) (74),(75),(76),(77),(78). All of the research, however, identified a minor distinction between those who use electronic cigarettes and those who use regular cigarettes and concluded that

the two products had similar detrimental impacts on oral health. Six of the included studies showed a rise in the plaque index , another periodontal measure, among smokers compared to those who use e-cigarettes and those who do not smoke (74),(75),(76),(77),(78),(73). On the other hand, users of e-cigarettes had a much higher plaque index, according to a study by ArRejaie et al (74). However, no variations in this regard were discovered in the remaining studies (71),(77),(73). Marginal bone loss, or MBL, did not rise in electronic cigarette smokers, though. This may be explained by the fact that e-cigarette users produce fewer oxygen radicals, as has been shown in vitro (79).

Electronic cigarettes smoking and oral microbiome change:

During a vaping session, the aerosols from e-cigarettes are directly exposed to oral microorganisms and oral epithelial cells. Research has demonstrated that e-cigarette usage can have a negative impact on oral health by releasing inflammatory cytokines and causing oxidative damage (80). The exposure to the aerosols from electronic cigarettes increased the quantity of genes present in bacteria that encode virulence factors, biofilm formation, stress response, and quorum sensing (81). Nevertheless, there is conflict and little information available at this time about how e-cigarettes affect the oral microbiome. However, a study discovered that e-cigarettes had no effect on the diversity of the oral microbiome (82), Some also agreed that changes have occurred in the relative number of specific bacterial species , such as and Villanelle and Porphyromonas, as well as shift in the microbial diversity (83), and *Haemophilus* in e-cigarette users as opposed to healthy people (84). Oral commensal Streptococcus spp. account for 80% of the oral microbiota (85)(86), resulting in our curiosity about how these oral resident bacteria are altered by e-cigarette aerosols. S. gordonii and Streptococcus sanguinis rule the niche at equilibrium. Streptococcus commensals, such as S. gordonii, S. oralis, and S. mitis showed no signs of modification in their exponential development phase when exposed to e-liquid and e-cigarette aerosols, according to two recent studies (87)(88). However, compared to unflavored e-cigarette aerosols, a different recent study showed that flavored aerosols significantly inhibited the expansion at an exponential rate of S. gordonii, S. intermedius, S. oralis and S. mitis, (89). Streptococcus mutans is an opportunistic pathogen because it is cariogenic (85) and its link to severe periodontal disease (90)(91). S. mutans is usually found within the mouth as an established dental biofilm. However, changes in the environment, such as density, nutritional availability, and pH, might make it dominate other species, leading to imbalance in the bacterial homeostasis of the mouth (92).

Despite the fact that many studies have examined the consequences of traditional tobacco products , e-liquids are predicted to cause greater impact on the oral microbiome due to their unique blend of propylene glycol, glycerin, flavorings, nicotine, and THC (83), examined the variations in the oral microbiota among those who use e-cigarettes and those who don't. They discovered that using e-cigarettes changed the microbiome and made some bacteria more abundant (Actinomyces, Fusobacteria, and Haemophilus). Increased cytokine production indicated that the dysbiosis in microbial communities was linked to increased inflammation (83). Veillonella was found in much higher relative abundances in the buccal saliva samples of e-cigarette users. Veillonella has also been discovered to be more common in persons who practice inadequate oral hygiene compared to individuals who follow high or moderate standards using species-specific primers (93)(94).

Furthermore, It has been suggested that a number of Veillonella species are responsible for the production of nitrosamines unique to tobacco because of their capacity to convert nitrate to nitrite (83), carcinogens produced when tobacco alkaloids are nitrosated (95)(96). Oral commensals, including S. intermedius, S. gordonii, S. mitis, and S. oralis , were toxic to the 100% concentration of flavors in e-liquids, such as strawberry, cinnamon, and menthol , in contrast to the flavorless equivalents. At high concentrations (5 to 25 percent), they inhibited bacterial growth in a way dependent on dosage (97)(89). Different amounts of nicotine or humectants in handmade flavored e-liquids either increased or decreased their development (97). S. intermedius was inhibited by menthol and cinnamon, but S. mitis, S. gordonii, and S. oralis were influenced by menthol, cinnamon, strawberry, and blueberry (89). All streptococci were inhibited by 5% concentrations of menthol and cinnamon, However, 3% cinnamon yielded the least amount of S. intermedius biofilm mass compared to tastes of tobacco, strawberries, and blueberries. It's interesting to note that these flavors had an impact on the biofilm mass at a concentration of 1%, much like the positive control. In a dose-dependent way, the tastes of menthol and cinnamon impeded the production and growth of biofilms from both single and multispecies. While the flavors of menthol, cinnamon, strawberry, and blueberry totally destroyed the growth, the flavored tobacco decreased the number of colonies. Tobacco flavor had the least impact on the establishment of microbial colonies since it just decreased the number of bacteria, whereas the flavors of cinnamon and menthol greatly hindered the formation of biofilms (97)(89).

There was no discernible difference between the strawberry-flavored and flavorless e-liquids' single-species biofilms.The multispecies biofilm biomass, however, dramatically decreased, suggesting that microbial communities were more sensitive to the flavor of strawberries (97). Although the flavorings did not have any bacteriolytic effects, they did decrease the amount of viable bacteria, particularly S oralis (97). As a result, these flavorings interfered with the hemostasis of the oral microbiota and encouraged tooth decay (97)(89). Their exposure to flavored aerosols and e-liquids, both at high and low levels, broke the multispecies equilibrium in oral biofilms, which led to tooth cavities and bacterial dysbiosis (97)(89). According to one study, EC users had a markedly increased incidence of hyperplastic candidiasis in comparison to traditional cigarette smokers (98). Another investigation discovered that individuals who use electronic cigarettes had a same prevalence of oral candidiasis, which is mostly caused by Candida albicans, compared to those who do not smoke. (99). Another study revealed that inhaling the vapor of ECs, either with or without nicotine, increased the expression of genes known to cause Candida albican pathogenicity as well as growth, length, and chitin content of the hyphal stage of the fungus (100). It was demonstrated that gingival epithelial cell differentiation was enhanced, and proliferation was inhibited when ECs were co-cultured with vapor-exposed Candida albicans. Compared to non-exposed controls, these effects of EC exposure were significantly higher, although not as great as those of cultures exposed to conventional smoking. For instance, some EC users have noted oral herpes in a journal of side effects (101).

Results and Discussion:

Tobacco is not burned or present in the e-cigarettes. Typically, e-cigarette liquid contains nicotine and comes in a variety of tastes, including fruits. (102). Nicotine is delivered by means of disposable cartridges that come in different concentrations and may be customized to the user's desired level of nicotine. Nicotine poisoning may be more likely to occur from eating, inhalation, or skin contact (103). The components that make up e-cigarettes vary greatly in composition. Nicotine is one of several

compounds that are mixed into the liquid used in e-cigarettes, often known as e-liquid. E-liquid solutions, cartridges, aerosols, and tobacco-specific nitrosamines (TSNAs) are among the chemicals found in e-cigarette refills, metals, volatile organic compounds (VOCs), phenolic compounds, flavorings, solvent carriers and tobacco alkaloids. These substances have negative or possibly negative impact on human health (104). Given these claims made in their marketing, the public believes e-cigarettes to be less addictive and safer than traditional cigarettes (105). Nicotine from e-cigarettes is easily absorbed through the gastrointestinal tract, respiratory airway, mucous membranes, and skin. Furthermore, children have been exposed to e-cigarette fluid toxicity mostly through ingestion, inhalation, cutaneous exposure, and ocular exposure (106).

Conclusions:

The usage of electronic cigarettes is quite contentious, but they are quickly being marketed as a replacement for traditional cigarettes. An increasing number of smoker's view e-cigarettes as an effective means of quitting, while others use them as a means of sustaining their nicotine consumption in public areas where tobacco use is prohibited. But no, electronic cigarettes are not a product for quitting smoking. People's perceptions of e-cigarettes are becoming confused due to non-scientific statements, leading them to assume that although they are safer and less addictive, using them is nonetheless dangerous and harmful to one's health. Until more evidence is available on the subject, the smoking of e-cigarettes should not be considered as safe. However, from our review of the literature and bearing in mind the long experience with theatrical mists, the short-term toxicity can be considered to be very low - except for some individuals with reactive airways - and the long-term toxicity depends on the additives and contaminants in PG and/or glycerol.

However, as the use of these devices with or without nicotine is rapidly increasing, we are still in need of data about its efficacy for smoking cessation. The e-cigarette is not used medically anywhere, at least not officially. If it were, manufacturers and their products would naturally have to be subjected to appropriate controls. Children and teenagers must not be allowed to use e-cigarettes, and their use should be regulated similarly to that of regular cigarettes.

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تأثير السجائر الإلكترونية على صحة الفم

حنين عباس علوان
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خلاصة:

الفيب، المعروف غالبًا باسم السيجارة الإلكترونية، هو جهاز يحاكي استخدام التبغ. أشهر منتجات التبغ التي يستخدمها الشباب هي السجائر الإلكترونية وأقلام الفيب، حيث أشار هذا البحث إلى أن السائل المطعم للسجائر الإلكترونية له تأثير سلبي على الأسنان وقد يسبب مشاكل أخرى لصحة الفم. اكتسبت السيجارة الإلكترونية شعبية في جميع أنحاء العالم منذ إطلاقها في عام 2003، وفي أغلب الأحيان بين الشباب (18–25 سنة). أدى مصطلح "التدخين" إلى ظهور مصطلح "استعمال الفيب"، الذي يصف تنفس "السائل الإلكتروني" المتطاير الذي تم تبخيره دون احتراقه بفضل جهاز تبخير إلكتروني صغير. تهدف هذه الدراسة إلى وصف السجائر الإلكترونية ومكوناتها، بالإضافة إلى تسليط الضوء على مخاطر تدخين السجائر الإلكترونية على صحة الإنسان، من حيث سلامتها؛ وتأثيرها على بدء التدخين والإقلاع عن التدخين؛ والقضايا التنظيمية المتعلقة باستخدامها. يمكن البحث في قواعد البيانات العلمية Scopusو Google Scholarو PubMedو Web of Scienceباستخدام الكلمات الرئيسية ذات الصلة للعثور على الأبحاث ذات الصلة. في الختام، للسجائر الإلكترونية تأثير على صحة الفم والصحة العامة.

الكلمات المفتاحية: السيجارة الإلكترونية، الفيب، مكونات سائل السيجارة الإلكترونية، أجيال السيجارة الإلكترونية، منتج التبغ، النيكوتين