

Vaping: Realities in its Effect on Oral Health

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Abstract

Twentieth-century shows a great increase in the popularity of E-cig or electronic cigar or Electronic Nicotine Delivering System (ENDS). When smoking is considered as a leading cause of preventable death and strict measures had been taken to limit smoking in public places, this ENDS is gaining popularity worldwide among the youngsters. A new term Vaping is given to the process of consuming nicotine or other substance through a vaporising tool or popularly called E-cigar. People are using it as a smoking cessation tool also, though this fact is being debatable after many types of research on it. The increasing use of it, along with a lack of knowledge of its health effect both short and long term is worrying.

Keywords: Vaping, Nicotine, Xerostomia, Halitosis, Glycol Vapour.

Introduction

Since nicotine is a gateway drug that lowers the threshold for addiction to other agents, the use of e-cigarettes could lead to even more opioid addictions. It is becoming a controversial issue nowadays both nationally and worldwide.¹ Vaping is gaining popularity among youngsters without being aware of its consequences. Besides its major oral effects, general health is also becoming a field of concern due to its respiratory and ocular problems caused by glycol vapour. There are also cardiac complications related to inhalation of nicotine vapour.²

The emergence of E-cigar: Many countries have implemented a smoking ban in most of the public places eg- restaurant, clubs etc. So smoking cigarette is decreasing day by day due to strong imposition of law. Thus the consumer market is left with a wide-open

market of an alternate form of taking nicotine. Electric devices or vaping pen is the one being promoted as a less harmful alternative with fun flavours (eg .coffee, maple syrup, mint menthol etc.) for recreational social use.^{3,4}

In the developed countries, vapour lounges or vapour houses are popping up everywhere at the shopping mall, strip mall etc. Youngsters buy their favourite flavoured vaping pens and enjoying relaxing and vaping on plush lounge chairs indoors. Users drink energy drinks while vaping. Some vapour liquid contains substances like caffeine and ginseng for an energy boost or as an alternative of non-nicotinic vaping.²⁻⁴

Effect on oral cavity: The E-cigarette users experiences (I) xerostomia (II) Increased risk of tooth caries (III) Halitosis (IV) Dental pigmentation. The E-cigarette uses a vaping liquid that has:

- (a) **Diacetyl:** It is a flavouring agent which is associated with serious lung disease, when heated to a high temperature and inhaled.
- (b) **Benzene:** It is a volatile inorganic compound found in car exhaust and it is linked to leukaemia and bone marrow disease.
- (c) Heavy metals like Lead, Nickel, Chromium and magnesium exceed the safe level of inhalation.

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- (d) **Nicotine:** It is an addictive stimulant and a potent parasympathomimetic alkaloid.
- (e) **Propyleneglycol:** It is a food additive sweetener that increases the risk of tooth decay. When used orally it breaks down into acetic acid, lactic acid and propionaldehyde, which are all toxic to enamel and soft tissue, moreover as it is a hygroscopic material, so causes tissue desiccation.
- (f) Glycerin and different flavouring which creates a palatable pleasure and increase the risk of tooth decay.

Research shows that 1 liquid nicotine cartridge contains about 200 puffs, equivalent to the amount of nicotine in one packet of 20 cigarettes.²⁻⁵

Vaping affects the oral cavity in 5 major ways:

- 1. Receding gingiva:** Nicotine in E-cigarette causes blood vessels to shrink and so less blood is transfer to the tissue. This causes gum recession. It can also cause periodontal pockets leading to infection & other health complications.⁵
- 2. Masks gum disease:** Dentist usually spots the gum disease by probing the pocket in the inflamed gingiva. But as vaping shrinks the blood vessels in that area, the symptom of bleeding on probing go without being diagnosed by a dental professional. This helps to progress the underlying disease without being caught.⁵
- 3. Amplifies bad breath:** Nicotine in vaping compromises body's ability to secrete saliva, which leaves the patient vulnerable to oral bacteria. This build-up Bactria can cause infection in compromised tissue and even lead to other long term illness eg. heart disease, oral cancer, xerostomia.⁵
- 4. Increases bruxism:** Nicotine of vaping stimulates masticatory muscles leading to bruxism which causes wearing down of teeth enamel, which leaves the patient more sensitive to the hot and cold temperature of food.⁵
- 5. Increases occurrence of tooth caries:** Research shows that streptococcus mutans, when exposed to aerosols from E-cigars on tooth enamel, shows to have 4 times more microbial adhesion and decreased enamel hardness up to 27%. The viscous property of the vaping liquid allows S.mutans to adhere to the pits & fissures and increases biofilm formation by two-fold when compared to unflavoured controls.⁵

The sweetener in vaping liquid has viscous properties compared to regular soft drinks and a high sucrose diet. Other than oral effects E-cigarette also affects general health. The patient who wants to quit smoking using E-cigarettes tends to revert into the habit of smoking. This is because the nicotinic content of many vaporiser oils can be higher than that of cigarettes, making it easy to fall back into the habit. More over vaping daily doubles up the risk of heart attack and have a significant impact on lung function, especially on long term use, continuing to evolve and bought quickly in the market. First-generation e-cigarettes are disposable ones more or less looked like traditional cigarettes. Then comes second-generation E-cigarettes which contains a clearomizer instead of the atomiser.⁶

Vaping: Vaping is the process of consuming vapours of a special liquid called vaping liquid, through a battery-operated device called electronic cigarette or E-cigars or E-hookahs or vaping pen or vaporising cigarettes etc. Nowadays the E-cigars come in various shapes and sizes. Some look like pens while others like USB devices, cigarettes etc. Some popular market names of vaping liquid brands are 21st-century smoke, 777e cigs, Blue e-cigs, Bull smoke, candy king on salt, Dura smoke, Diamond mist E-liquids, Dragonite international limited, E Z smoke, E-lites, Eco pure, Fill my pod, Five pawns, Fantasia, Green Smoke, Hot vapes, Juul, J vapes E-liquid, Kandy pens, LOGIC, Lost vape, Lite-Up Anywhere, Magic Mist, Made Vapes, Mi-Pod, Mountain Moon, Njoy, Pink Sticks, P.O.E.T Electronic Nectar etc. With such appealing marketing names, they are gripping the youngsters in today's world. Their selling is also encouraged through celebrity endorsements.⁷

Parts of E -Cigars/Vaping pens:

In most of the marketed E-cigars, they have the following parts:

The mouth Piece: Users inhales through engaging this which has a small cup inside containing absorbent material soaked in vaping liquid solution.

The Cartridge: Vaping liquid cartridge holds the liquid which comes in a variety of flavours and Nicotine levels.

The Automizer/Heater: It heats & vaporises a small amount of the solution which is regulated by a computer chip. Here the vapour resembles smoke.

The Battery: This can be rechargeable lithium-ion batteries that last for 1-3 days.

The Endcap: It contains a LED light that illuminates when inhaled or the user sucks on the device.

The sensor: When the user presses the activation button or merely inhale the device, it causes the inbuilt sensor to activate the vaporising chamber. Additional components include USB, portable wall and personal chargers.⁸

Types of E-Cigars/Vaping Pens:

They are available in the market in different types. They are

Disposable E-cigarettes – It is non-rechargeable or refillable and is intended to be discarded after the product stops producing aerosol. Sometimes it is called E-hookah Examples – NJOY, OneJoy etc.

Rechargeable E-cigarettes – It has a rechargeable battery. Very often it contains an element that regulates puff duration and/or how many puffs may be taken consecutively. Examples- Blu, Green smoke etc.⁹

Pen-style, medium-sized rechargeable E-cigarettes – It is usually larger than a cigarette. It contains prefilled cartridge or refillable cartridge. It often comes with a manual switch to regulate the length and frequency of puffs. Examples – Vapor king, Totally Wicked Tornado.

Tank-style, large size rechargeable E-cigarettes – It is a much larger size with higher capacity battery and essentially contains a large, refillable cartridge. It often contains manual switches and a battery casing for customising battery capacity. Examples- Volcano, Lavatube.⁹

Evolution of E-Cigarettes: Since the year 2003 when the first generations E-cigars were first introduced by Hon Lik, it is Clearomizer is the technology which has a vaping liquid, reservoir and atomiser coil all within one single unit. Then comes third-generation E-cigarettes which are much larger than the earlier ones. Here the user can customaries tank, how much E-liquid it contained and voltage or power the device can output. The fourth and most recent generation is the most advanced one in the market. This device has regulator to regulate temperature and lower resistance coil to produce bigger and most powerful vapours.¹⁰

Reason to Abstain E-Cigars:

1. They usually contain nicotine- This leads it too becomes habit-forming, harming foetus if used in pregnancy and affects brain development.
2. They contain other toxins – It has carcinogens like acetaldehyde, formaldehyde etc.
3. Quitting smoking may be harder
4. They cause second-hand smoke.
5. They may not deter smokers.
6. They can harm brain
7. Experimental use may be more dangerous.

This current evidence indicates that using E-cigarettes is dangerous especially for young people and people who never smoked. Though E-cigars may help some people to stop smoking it has no FDA approval as a tool for quality smoking.¹¹

Conclusion

Though it seems that electronic cigarettes are less harmful than the conventional ones, research shows that E-cigarettes confers greater susceptibility to the development of alteration in oral biological tissues when compared to ex-smokers or non-smokers. There are diverse adverse effects of E-cigarette of which common in oxidative stress. This is caused by reactive oxygen species(ROS), present in its aerosols, which depends on a set of parameters like the different volume of vapour, voltage settings, the type and state of heating systems etc. Aldehydes & free radicals found in E-cigarette aerosols trigger various type of DNA damage. The safety of electronic devices is also questionable with the potential risk of explosion & fires. Burns, lacerations etc are also common with vaping. Lastly, prospective surveys should be done addressing the potential long term effects on oral as well as a general health condition. The findings will emphasize the need for constructing persuasive vaping prevention messages, promoting public health welfare.

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