

VAPING AND CARDIOVASCULAR HEALTH – AN OPPORTUNITY OR A RISK?

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The history of smoking dates back to the ancient times and mankind has been smoking different plant materials for the leisure and addiction. One of its kind, tobacco cigarette smoking was introduced in the 19th century and its use increased exponentially by the mid of 20th century. Initially it was thought that the tobacco cigarette smoking had some medicinal properties but as the rate of tobacco smoking increased, the adverse effects started appearing and by the end of 20th century it was a well-known fact that tobacco cigarette smoking was a health hazard and a major risk factor for the fatal diseases like cancer and cardiovascular diseases¹. With the emergent side effects and health hazards tobacco cigarette smoking was discouraged on a larger scale in the society and the search for the alternative to it led to the creation of E-cigarettes in the early 21st century.

Since the introduction of vaping i.e., use of E-cigarettes, E-hookahs, vape pens or Electronic Nicotine Delivery Systems (ENDS), it is taken as a safe alternative of tobacco cigarettes smoking and a way to help in smoking cessation². The perception of less harmful tobacco smoking substitute, extensive marketing and a vogue of vaping have resulted in an explosive increase in the use of vaping devices among the former smokers, current smokers and even in never smoker adolescents and young adults in the past two decades. According to the National Health Interview Survey (NIHS), the number of E-cigarette users increased to 8.1 million in United States in 2018³ and according to National Youth Tobacco Survey in US 19.6% of high school students and 4.7% of middle school students are regular users of E-cigarettes⁴.

Most vaping devices are made up of four components, including: a cartridge or pod containing e-liquid, a metallic heating coil, a battery and a mouthpiece. The e-liquid contains chemicals like propylene glycol, vegetable glycerin, flavoring substance and varying amount of nicotine. Propylene glycol and vegetable glycerin act as solvent carriers. When a person puffs/inhales, it activates the heating coil that causes the e-liquid to vaporize that is inhaled by the person. The vapors or aerosols that are inhaled deliver certain chemicals into the body that are mainly:

- Nicotine
- Organic volatile compounds generated by heating of solvent carriers such as glycols, glycerin, toluene that cause irritation to the eyes, oral and laryngeal mucosa.
- Carbonyls such as acetaldehyde, formaldehyde, acrolein and glyoxal which are carcinogenic and cause extensive damage to the lungs.
- Chemical present in flavoring agents like Diacetyl, acetyl propionyl and acetoin cause severe asthma and bronchiolitis obliterans
- The contaminants that may be the tobacco derived alkaloids and nitrosamines
- Metal particles from the heating coils like chromium, cadmium, nickel, lead; and particles of copper, nickel, and silver

These chemicals are responsible for the injuries to the respiratory mucosa, skin and are considered as carcinogens.

The cardiovascular effects of vaping are mediated by:

- Nicotine, it has been demonstrated that activation of nicotinic Ach receptors causes release of catecholamines and promotes hemodynamic alterations, endothelial dysfunction, insulin resistance, dyslipidemia and arrhythmogenesis⁵.
- Increased oxidative stress that is produced due to aerosolized chemicals, metals, particulates and acrolein. It causes generation of oxygen derived free radical species causing inflammation and damage to the endothelial cells, reduced bioavailability of NO, plaque destabilization, platelet activation and thrombus formation causing myocardial infarction, stroke and cardiovascular events⁵.

Though tobacco cigarette smoking is 3 times more harmful than vaping⁶ the studies have shown that

the vaping is associated with increased risk of cardiovascular events as compared to non-users and the use of tobacco cigarette smoking along with vaping cause the highest number of cardiovascular events as compared to non-users, vaping or tobacco cigarette smoking alone⁷.

The vaping epidemic and its potential hazards can be controlled by certain measures:

- Regulating the advertisements of e-cigarettes
- Reducing the access of adolescents and young adults to the vaping products
- Public awareness campaigns to educate children and adults about the harmful effects of vaping
- Reducing the second-hand exposure to vaping aerosols by precluding its use in the indoors and public spaces.

The studies so far have not proved vaping to be an effective tool for smoking cessation, instead the user who start vaping for smoking cessation often end up using both and the use of vaping among adolescents increases the propensity of them to become tobacco cigarette smoker. In the author's opinion the use of vaping should not be recommended, and its use should be discouraged owing to its adverse effects on health.

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