Editorial

Health Concern in Electronic Cigarettes

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At present, there are two categories of cigarettes, namely, combustible cigarette and non-combustible or electronic cigarettes.While combustible cigarettes release smoke, electronic cigarettes produce vapor or aerosol mist.

To address the concerns of harm from tobacco smoke, which contains over 100 potentially harmful chemicals to human health. Exposure to those chemicals is a well-known cause of smoking-related diseases, such as, chronic bronchitis, pulmonary emphysema, and bronchial cancers. On the other hand, without combustion or burning, electronic cigarettes (EC), either the nicotine liquid, or the heat-not-burn tobacco sticks, produce no tar and emit less toxicants. In this regard, both types of the less harm e-cigarettes have been recommended for using as alternative solution as harm reduction strategies for addicted cigarette smokers. It is becoming more popular worldwide, especially in the U.S.A. Adolescent usage is more prevalent and may lead to actual tobacco smoking addiction.

In 2019, an outbreak of EC-related pulmonary conditions was reported in the United States. Most patients presented with dyspnea, cough, gastrointestinal and flu-like symptoms. In severe cases, they may need mechanical ventilation. Therefore, the term EC or vaping product use associated lung injury (EVALI) was coined by the Centers for Disease Control (CDC).[1] Recent findings indicated that the vaping associated lung injury (EVALI) was attributed to a physical interaction between toxicants particularly vitamin E acetate in the vaping solution and the pulmonary surfactant, causing failure of the pulmonary surfactant causing alveolar collapse upon expiration.[2] Nevertheless, there is not enough evidence to rule out the contribution of numerously potentially dangerous chemicals which may cause inhalation risk and harm to respiratory health. The examination of EC upon types and levels of chemicals in samples of the electronic nicotine delivery systems (ENDS), e.g. phthalates, phenolic compounds, and flame retardants was studied. The results showed that phthalates were the most prevalent chemicals in the tested samples, followed by parabens and organophosphate.[3]

EVALI can occur acutely after use of a nichrome heating element at high power, without the use of tetrahydrocannabinol, vitamin E, or nicotine. Experimental study revealed many lung pathological lesion which included thickening of the alveolar wall with foci of inflammation, red blood cell congestion, obliteration of alveolar spaces, and pneumonitis in some cases; bronchi showed accumulation of fibrin, inflammatory cells, and mucus plugs. EC may be more dangerous if operating at high settings. EVALI may not be dependent upon tetrahydrocannabinol, vitamin E, or nicotine.[5] Due to the less rigorous control on EC, the heterogeneity in the composition of e-liquids available on the market causes more difficulty in studying these adverse effects.

More evidences of the harmful effects of EC to pulmonary health emerges. EC exposure can disrupt pulmonary homeostasis, ranging from gas exchange disturbance, reduced lung function, increased airway inflammation and oxidative stress, downregulation of immunity, and increased risk of respiratory infection. Therefore, there is an urgent need to define the long-term implications of vaping, especially in developmental lung and coexisting respiratory condition.[4] Rapid development of EC in terms of technology,

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equipment, flavors and chemicals lead to more addictive behavior because it is more user friendly and potentially less local adverse event. Third-generation E-cigarettes may cause adverse effects in the oral cavity, and repeated use of the same atomizer to generate aerosol may enhance the potential toxic effects.[6]

EC and its aerosol constituents, nicotine, carbonyl compounds, particulate matter, metals, and flavorings can have harmful adverse effects on the cardiovascular system. EC use is associated with inflammation, oxidative stress, and hemodynamic imbalance leading to increased cardiovascular disease risk.[7] It is quite difficult to standardize the clinical study and determine the composition and levels of chemicals released in aerosols. Further experimental and long term data are urgently needed before advocating EC as a tobacco alternative or as a smoking cessation tool.

Regarding brain health, there was little information in chronic human exposure. A few animal studies revealed short-term memory or anxiety behavior in offspring of EC exposed pregnant mice.At the molecular level, EC can induce broad epigenetic alterations, mitochondrial dysfunction, inflammation, oxidative stress, calcium, and neurotransmitter dyshomeostasis.[8]

Conclusions

It is important to note that the EC preparations are quite varied, most studies in EC were exclusively of nicotine-liquid type. EC and its constituents are the culprits to the adverse effects. Their results were preliminary and warrant further studies for understanding the potential negative health effects and to what extent those chemicals may cause, and for developing evidence-based standards to regulatory control the types and levels of chemical products. Current findings support that e-cigarettes are not a harm-free alternative to tobacco smoke. In addition, the increasing popularity of EC among vulnerable populations, such as adolescents and pregnant women, calls for further EC safety evaluation.

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