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Debunking e-cigarette myths: a public health necessity – disentangling facts from fiction

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Dear Editor,

The global increase in e-cigarette usage, coupled with its promotion as a harm reduction tool, calls for a deeper examination of the myths *vs.* the scientific evidence. Electronic cigarettes (ECs) are portable vaping devices that produce an aerosol by heating a liquid solution known as e-liquid [1]. While e-cigarettes are often regarded as a safer alternative to traditional smoking and to quit, their implications for public health remain unclear, as most deliver nicotine and diacetyl- both highly harmful and addictive substances- that

require urgent attention.

E-cigarettes are a safe alternative to traditional smoking. E-cigarettes, often marketed under the umbrella of Electronic Nicotine Delivery Systems (ENDS), have diversified into multiple generations, from cig-a-likes to pod systems. Proponents emphasize their reduced toxicity compared to traditional cigarettes, citing the absence of combustion as a key factor. As a result, e-cigarette use has surged, especially among young people, leading to them quickly becoming the most popular tobacco product in the USA [2]. However, e-cigarette aerosols contain over 80 chemicals, including nicotine, which is not only addictive but also implicated in cardiovascular and respiratory harm. Nicotine exposure through e-cigarettes is often unpredictable due to inconsistent regulation, particularly in lower-middle-income countries like Pakistan.

E-cigarettes are effective for smoking cessation. Another major myth is their utility as a smoking cessation aid. A Cochrane review highlights a marginal advantage of nicotine e cigarettes over nicotine replacement therapy for smoking cessation [1]. However, these benefits are countered by the risk of initiating nicotine addiction among non-smokers, especially youth. Chain smokers, while attempting to quit traditional smoking, often turn to e-cigarettes as a nicotine replacement during their rehabilitation period, despite the ongoing debate about the efficacy of e-cigarettes [3]. Smoke-Free Alternatives Trade Association (SAFTA) and the American Vaping Association (AVA) are a few groups that advocate the promotion of e-cigarette use in adults as a safer alternative to cigarettes. Despite its promotion as a smoking cessation tool for adults, most of the users are either high school students or youth between 18 and 24 years [4].

Disentangling facts from fiction. The launch of e-cigarettes as a “smokeless nontobacco cigarette” followed by “flavour cigarette” and “electronic atomizing cigarette” in the USA and China has been advertised as a replacement for nicotine products since the 1960s that could be used for smoking cessation and a non-combustible alternative to traditional smoking practices. The device also gained popularity when a strong association was seen between tobacco smoking and lung cancer [5]. However, there is an increasing amount of literature suggesting associations of chronic use with histopathological changes in endothelial and lung tissue along with respiratory complications, including e-cigarette or vaping product use-associated lung injury (EVALI), initially targeting the gastrointestinal system EVALI presents with typical symptoms of nausea, vomiting, diarrhoea, and

abdominal pain in nearly 77% of the victims. After experiencing these symptoms, 95% of patients present with respiratory issues, including cough, chest pain, and dyspnoea. These symptoms often present with intense chills, fever, and a notably low body mass index (BMI), highlighting the seriousness of the condition. In addition, patients commonly present with tachypnoea, associated with pulse oximetry statistics of less than 95% [6]. A study comparing the effects of vaping on asthmatic patients with healthy participants shows that e-cigarettes not only target the pulmonary function but also alter the airway inflammation in asthmatic patients within five minutes of vaping [7]. Moreover, studies also advocate the deterioration of lung function and exacerbation of symptoms in patients with COPD along with the increased resistance to air flow in not just asthmatic but also healthy participants [8-10].

Since 2019, clinicians and researchers have identified e-cigarette or vape-associated lung injuries as serious respiratory illnesses. Studies also reveal cardiovascular effects, such as increased arterial stiffness and heightened heart rate, alongside pulmonary risks, including chronic obstructive pulmonary disease (COPD) [11]. Diacetyl (2, 3-butanedione), a flavouring agent popular for causing irreversible obstructive lung disease, i.e., acute onset bronchiolitis obliterans, previously referred as “popcorn lungs”, is a major component of the e-liquid [12,13]. Researchers have estimated that people smoking up to 3 ml of e-liquid per day could be exposed to dangerous levels of diacetyl. These liquids expose the users to levels of diacetyl higher than the safe limit set by the National Institute for Occupational Safety and Health (NIOSH) and the Centres for Disease Control (CDC) for workers exposed to it over an 8-hour workday [14].

Further support was provided to this idea when the Centres for Disease Control and Prevention (CDC) reported 2,807 cases and 68 fatalities in the year 2020. These cases illustrated the frightening effect of this diagnosis on the public [15]. These findings necessitate stringent regulatory oversight and public education campaigns to mitigate misinformation. E-cigarette or vaping-associated lung injury – EVALI- typically presents with respiratory symptoms, and chest X-rays or CT scans frequently reveal bilateral ground-glass opacities, with occasional findings of consolidation or pleural fluid (Fig.1). This injury is caused by harmful aldehyde components found in e-cigarettes. These substances lead to inflammation of the respiratory lining by promoting the formation of reactive oxygen species and causing DNA damage in cells. Additionally, they negatively impact the development

of neural circuits in young individuals [16].

The rising popularity of vaping among adolescents and teenagers has become a growing public health concern, distinctly because many young users have never smoked traditional cigarettes before. Today's youth is drawn to vaping for social and psychological reasons rather than addiction alone, unlike the previous generations, where smoking was often linked to nicotine dependence. Part of the reason for youth becoming part of the vaping community without any prior smoking addiction is the "You have to vape to make it through" mind set, considering it a "social thing" [17]. Most middle school students believe that vaping helps in relieving daily life stress in addition to making them feel better about themselves. Some adolescents believe that vaping is common in their age group because of its flavours, while others think it helps them better fit in society [17].

To address these challenges, governments and public health bodies must enforce evidence-based policies that balance harm reduction for current smokers with prevention strategies for non-smokers. These include bans on smoking in public areas, marketing regulations, enforcing nicotine concentration limits, regulating product safety, implementing strict rules to shield non-smokers from exposure to e-cigarettes, conducting studies involving clinical trials and experimental models to understand their effects better, and promoting awareness of potential risks [18]. Until comprehensive evidence is available, healthcare professionals should exercise caution when endorsing e-cigarettes for smoking cessation.

Dispelling myths about e-cigarettes is not just a public health priority but an ethical imperative. Preventing the glamorization of these devices requires transparent information and sound regulatory frameworks to protect health.

References

1. Lindson N, Butler AR, McRobbie H, et al. Electronic cigarettes for smoking cessation. Cochrane Database Syst Rev 2024;1:CD010216.

2. Centers for Disease Control and Prevention. Tobacco use among middle and high school students. 2023. Available from: https://www.cdc.gov/mmwr/volumes/72/wr/mm7244a1.htm#:~:text=In%202023%2C%2010.0%25%20(representing,from%2014.1%25%20to%2010.0%25).

3. Jha P, Ramasundarahettige C, Landsman V, et al. 21st-century hazards of smoking and benefits of cessation in the United States. N Engl J Med 2013;368:341-50.

4. National Center for Chronic Disease Prevention and Health Promotion (US) Office on Smoking and Health. E-Cigarette Use Among Youth and Young Adults: A Report of the Surgeon General [Internet]. Atlanta (GA): Centers for Disease Control and Prevention (US); 2016. Available from: https://www.ncbi.nlm.nih.gov/books/NBK538680/ .

5. Famiglietti A, Memoli JW, Khaitan PG. Are electronic cigarettes and vaping effective tools for smoking cessation? Limited evidence on surgical outcomes: a narrative review. J Thorac Dis 2021;13:384-95.

6. Salzman GA, Alqawasma M, Asad H. Vaping Associated Lung Injury (EVALI): An Explosive United States Epidemic. Mo Med 2019;116:492-6.

7. Kotoulas SC, Pataka A, Domvri K, et al. Acute effects of e-cigarette vaping on pulmonary function and airway inflammation in healthy individuals and in patients with asthma: Acute effects of e-cigarette in asthma. Respirology 2020;25:1037-45.

8. Vardavas CI, Anagnostopoulos N, Kougias M, et al. Short-term pulmonary effects of using an electronic cigarette: impact on respiratory flow resistance, impedance, and exhaled nitric oxide. Chest 2012;141:1400-6.

9. Lappas AS, Tzortzi AS, Konstantinidi EM, et al. Short-term respiratory effects of e-cigarettes in healthy individuals and smokers with asthma. Respirology 2018;23:291-7.

10. Palamidas A, Tsikrika S, Katsaounou PA, et al. Acute effects of short-term use of e-cigarettes on airways physiology and respiratory symptoms in smokers with and without airway obstructive diseases and in healthy non-smokers. Tob Prev Cessat 2017;3:5.

11. Johns Hopkins Medicine. "Vaping" increases odds of asthma and COPD. 2020. Available from: https://www.hopkinsmedicine.org/news/newsroom/news-releases/2020/01/vaping-increases-odds-of-asthma-and-copd.

12. Farsalinos KE, Kistler KA, Gillman G, Voudris V. Evaluation of electronic cigarette liquids and aerosol for the presence of selected inhalation toxins. Nicotine Tob Res 2015;17:168-74.

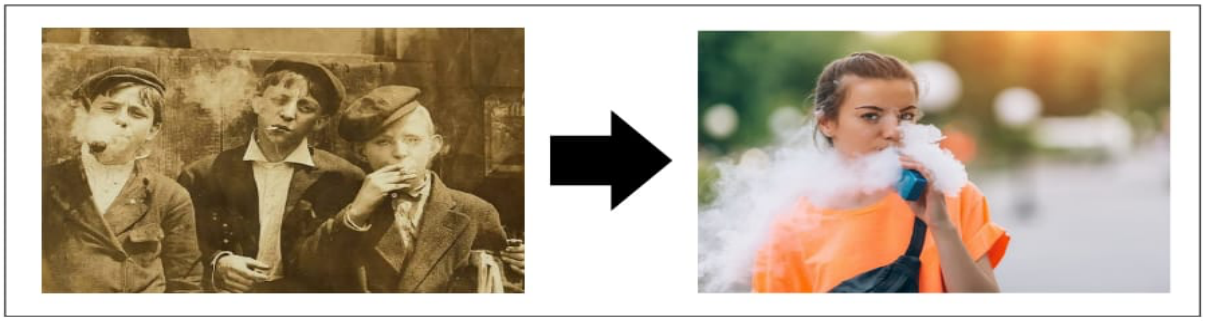
13. Johns Hopkins Medicine. What does vaping do to your lungs? Available from: https://www.hopkinsmedicine.org/health/wellness-and-prevention/what-does-vaping-do-to-your-lungs.

14. Clapp PW, Jaspers I. Electronic cigarettes: their constituents and potential links to asthma. Curr Allergy Asthma Rep 2017;17:79.

15. Acharya S, Ali SI, Anwar S, Glaser A. Do not fall to the vape trap! Respir Med Case

Rep 2020;31:101165.
16. Auschwitz E, Almeda J, Andl CD. Mechanisms of E-cigarette vape-induced epithelial cell damage. Cells 2023;12:2552.
17. Fairman RT, Weaver SR, Akani BC, et al. "You have to vape to make it through": E-cigarette Outcome Expectancies among Youth and Parents. Am J Health Behav 2021;45:933-46.
18. Yayan J, Franke KJ, Biancosino C, Rasche K. Comparative systematic review on the safety of e-cigarettes and conventional cigarettes. Food Chem Toxicol 2024;185:114507.

Figure 1. Computed tomography scan showing bilateral ground-glass opacities in a patient with EVALI, a hallmark diagnostic feature. Reproduced from: Acharya *et al.* [15].



20th century smoking practices 21st century smoking practices

Figure 2. 20th century to 21st century-evolution of smoking. Reproduced from: Lewis Hine - Library of Congress (on the left), Wikimedia (on the right).