

Commentary

The looming threat of EVALI in India: addressing the rise of vaping: associated lung injury

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ABSTRACT

Vaping is currently banned in India, yet documents reveal a concerning prevalence of vaping across the country. This paradox calls for immediate attention, as the dangers associated with vaping are not hypothetical but have already caused a significant health crisis globally. The EVALI (e-cigarette or vaping-associated lung injury) epidemic in the United States serves as a stark warning. In the U.S., this epidemic overwhelmed healthcare systems, leading to thousands of hospitalizations and even deaths. If such a situation were to occur in India, the consequences would be disastrous. India's healthcare system, though robust in many aspects, is not prepared to handle an outbreak of vaping-related health crises. With vaping being banned, healthcare workers may lack the necessary training and resources to effectively address the health complications associated with it. The situation could spiral out of control, straining healthcare infrastructure and putting lives at risk. Therefore, it is imperative that stricter enforcement of the vaping ban is implemented, accompanied by heightened awareness campaigns for both healthcare professionals and the general public. Preventive measures, including education on the dangers of vaping and the enforcement of the law, are essential to safeguard public health and prevent a potential public health disaster in India.

Keywords: EVALI epidemic, Public health crisis, E-cigarettes, Vaping

INTRODUCTION

Electronic cigarettes famously known as e cigs, vapes, e hookahs, vape pens, tanks, mods, JUULS, electronic nicotine delivery system ENDS, electronic non nicotine delivery system ENNDS which claims to not contain nicotine, is very popular among youth.¹ E-cig devices are composed of a battery, a reservoir for holding a solution, a heating element or an atomizer, and a mouthpiece through which the user puffs.¹ The liquid used is called as e-liquid or e-juice or vape juice or vape liquid. Smoking e-cigs is called as vaping.

Electronic cigarette design was initially patented in US by Herbert A. Gilbert in 1963.³ Later in 2003 a Chinese

pharmacist Hon Lik invented first e cigarette device.³ E cigarettes gained immense popularity since 2013 all over the world.¹ They not only helped people to get rid of smoking but were considered less harm-full than tobacco products. Not much was known about e cigs then and were a well-accepted NRTSs in the market. Various initiatives taken by WHO, Government and other organizations, resulted into increased awareness of hazardous effects of tobacco smoking and people were looking for alternative products.⁴ As tobacco industry was clearly on decline and e cigs were gaining popularity, tobacco industry started promoting e cigs and e cigs became a perfect alternative to conventional cigarettes also target population got shifted from adult smokers who wanted to quit to adolescents.⁵ Younger generation is

especially attracted to it because it being considered as less harmful or harmless and have thousands of flavors.^{1,4}

ENDS type of e cigs clearly contain nicotine, and ENNDS which claims to have no nicotine is actually having traces of nicotine.⁶ Studies are saying that the nicotine used in the liquid is now getting extracted from tobacco. Irrespective of type and flavor the vape liquid contains some chemicals compulsorily like nicotine (3-60 mg/ml), glycerol (0.3-95 gm/100 gm), propylene glycol (0.4-98 gm/100 gm) and ethylene glycol (10 gm/100 gm avg).⁶ These chemicals have very severe effects on human health.⁷ One of the severe consequences of e cigs vaping is EVALI.¹⁰

THE EVALI EPIDEMIC: LESSONS FROM U. S.

EVALI stands for E cigarettes or vaping products associated lung injury. EVALI is a severe pulmonary illness associated with vaping products officially identified in 2019 in US after its introduction in US Markets in 2007.⁹ It was previously known as VAPI, vaping associated pulmonary illness.¹⁰ Studies stated that EVALI like issues were noticed since 2012 and are continued till date, but peaked in 2019, cases increased sharply from August 2019 to September 2019, peaking at 215 cases a week during the week of September 15.¹⁰⁻¹¹ After that, cases declined steadily so CDC stopped monitoring the disease in February 2020.⁹⁻¹² Two reasons behind declining cases were awareness that was created and COVID 19 pandemic which shoot down schools and colleges.¹³ During this period in the US, 2807 individuals were hospitalized and 68 individuals died of EVALI.¹⁰ According to American thoracic society workshop 2021, 92 more cases were reported between 2020-21.¹⁰

ETIOLOGY

The main culprit behind this was vitamin E acetate (VEA).^{13,14} A recent study identified vitamin E acetate in bronchoalveolar lavage (BAL) fluid samples of 48 out of the 51 patients with EVALI, whereas nothing is found BAL of healthy control group.¹⁵ Vitamin E acetate was illegally used as a diluent in multiple counterfeits, low-cost tetrahydrocannabinol (THC) containing cartridges. THC-based cartridges became common in 2019, coinciding with the EVALI outbreak, but the chances of involvement of other chemicals cannot be ruled out.¹⁵

CLINICAL SIGNS AND SYMPTOMS

Clinically EVALI typically presents as an acute or subacute respiratory illness including shortness of breath, cough, chest pain, hemoptysis, may also show some gastrointestinal symptoms like nausea, vomiting, diarrhea and constitutional symptoms like fever, chills, fatigue and/or weight loss.^{10,16} Some patients may have a reduced pulse oxygen saturation up-to $\leq 88\%$.¹⁶ It is important to note that EVALI is a diagnosis of exclusion.¹⁶ Therefore it is necessary to rule out other possible causes of lung

injury, such as viral pneumonia, community-acquired pneumonia, and any ongoing chronic inflammatory process that might affect the lungs.¹⁷

DIAGNOSIS

EVALI is a syndrome with no specific diagnostic test.¹⁰ Confirmed cases are defined occur within 90 days of e cig use, and shows opacities, on plain film chest radiograph or ground-glass opacities on chest CT that with no alternate cause found after medical assessment.¹⁰

RADIOGRAPHIC FEATURES

Radiographically plain chest radiographs mostly show hazy bilateral opacities with central and peripheral sparing. The common CT finding is diffuse bilateral ground-glass opacities, with a basilar predominance and sometimes subpleural or lobular sparing.¹⁶ The most severe pattern of lung injury in EVALI is a diffuse alveolar damage pattern.¹⁰

HISTOPATHOLOGICAL FEATURES

Histopathologically, lung biopsies showed histological evidence of acute to subacute lung injury, including diffuse alveolar damage or organising pneumonia in most cases and less common similar to acute fibrinous pneumonia.^{8,10}

LABORATORY EVALUATION

To confirm the diagnosis one should include a complete blood count with differential liver transaminases and inflammatory markers (e.g., erythrocyte sedimentation rate and C-reactive protein). Moreover, urine toxicology testing, with informed consent, including testing for THC, should be carried out on all patients.¹⁶

TREATMENT PLAN

Till date no specific treatment plan to EVALI has been given, but most patients survived to hospitalization, which include supplemental oxygen therapy, non-invasive ventilation, mechanical ventilation and sometimes antibiotic therapy or corticosteroid therapy.¹⁰ Systemic glucocorticoids are recommended only for patients who meet the criteria for EVALI and have progressive symptoms and/or hypoxemia as a short course, starting with the methylprednisolone 0.5 to 1 mg/kg per day or 40 to 60 mg of prednisone tapered over no longer than 14 days.¹⁶ Next difficulty is after the discharge, recall after 48 hours is must as cases of relapse and sometimes death have been seen after 48 hours.¹⁰

DIFFERENTIAL DIAGNOSIS

EVALI is a relatively new disease, and there is a lot of confusion surrounding the diagnosis since it has similar clinicopathologic features to that of various other

pulmonary diseases. The following patterns of lung injury have been reported with EVALI:¹⁶ Acute eosinophilic pneumonia, lipoid pneumonia, acute lung injury and acute respiratory distress syndrome, acute and subacute hypersensitivity pneumonitis, organizing pneumonia, acute eosinophilic pneumonia, diffuse alveolar haemorrhage and respiratory bronchiolitis-associated pneumonitis.

CURRENT STATUS OF VAPING IN INDIA

India banned e cigarettes in 2019.¹⁸ Electronic/e-cigarettes is still a public health challenge in India despite comprehensive bans.¹ Despite India's proactive measures to regulate e-cigarettes, including the prohibition of electronic cigarettes act (PECA) of 2019, vaping continues to pose a public health challenge.¹⁸ The prevalence of e-cigarette uses among Indian youth and the ongoing availability of these products highlight significant gaps in enforcement and societal challenges.

Despite the current ban on e-cigarettes in India and the penalties in place to prevent e-cigarette availability, the stipulated penalties for breaching the ban are substantial-first offenders are fined up to Rs. 100 000 (\$US1,403) and can be imprisoned for up to a year, and subsequent offences can attract a fine of up to Rs. 500 000 and three years of imprisonment around one in ten of the young adults reported being a current vaper and a further 14 % reported having used e-cigarettes in the past.¹⁹ As a result, India banned e cigs under PECA act 2019 wherein the production, sale, and advertisement of electronic cigarettes (e-cigarettes) is banned in India. Despite these penalties, e-cigarettes are reported to be widely available across a range of sources including tobacconists, general stores, and online providers.¹⁹

Although national-level data on vaping prevalence in India remains limited, regional studies indicate a concerning trend. A survey conducted in Mumbai in 2020 revealed that approximately 5% of urban adolescents had tried e-cigarettes, with peer influence being a significant factor. Another study among college students in Delhi found that 7.2% of respondents had used e-cigarettes, with most citing curiosity and perceived reduced harm compared to traditional smoking. These findings suggest that despite legal restrictions, e-cigarettes continue to attract young users.

OVERVIEW OF THE PECA ACT (2019) AND ITS PROVISIONS

In September 2019, the Indian government introduced the PECA Act to curb the rising use of e-cigarettes. The legislation prohibits the production, manufacture, import, export, transport, sale, distribution, storage, and advertising of e-cigarettes. The act defines e-cigarettes as battery-operated devices that deliver nicotine, often through an aerosol. Violations of this law carry strict penalties, including imprisonment and fines.

The PECA Act reflects India's recognition of the health risks associated with vaping and the need to prevent its adoption, particularly among youth. However, its success depends on effective enforcement and public awareness of the law.

FACTORS CONTRIBUTING TO THE ONGOING USE OF E-CIGARETTES

Peer pressure: Adolescents and young adults often experiment with vaping under the influence of friends. The social acceptance of e-cigarettes as a modern, less harmful alternative to smoking contributes to their popularity.²⁰

Online availability: The proliferation of e-commerce platforms and social media has made e-cigarettes accessible despite the ban. Vendors exploit loopholes in the regulation to market and sell these products discreetly.²¹

Flavoured options: The availability of flavoured e-liquids, such as fruit, mint, and dessert flavours, appeals to younger audiences, making vaping attractive to first-time users. These flavours mask the harshness of nicotine, encouraging continued use. In 2024, nearly 9 out of 10 middle and high school students who currently used e-cigarettes used a flavoured product. The most commonly used flavours were fruit, candy, and mint.^{22,23}

Inconspicuous usage: Unlike traditional cigarettes, e-cigarettes lack the strong, lingering smell of smoke, making them harder for parents or guardians to detect. This inconspicuous nature, combined with their sleek design, allows users-especially adolescents-to vape without drawing attention.

EVALI IN INDIA: A TICKING TIME BOMB

In India, the situation is compounded by several factors:

Prevalence of underground vaping markets: Despite PECA 2019, e-cigarettes remain accessible through illegal online sales and unregulated vendors. These products often escape quality checks, increasing the likelihood of contamination.²⁴

Insufficient monitoring: Regulatory authorities often lack the resources and manpower to monitor and crack down on illegal e-cigarette sales, particularly online.²⁵

Public misconceptions: Many individuals mistakenly perceive e-cigarettes as a safer alternative to traditional smoking. The lack of widespread awareness campaigns further exacerbates this issue.²⁶

Limited penalties: While the PECA Act prescribes penalties, inconsistent application of these sanctions undermines its deterrent effect.²⁷

Youth attraction to vaping: Studies indicate that flavoured vaping products and peer pressure drive experimentation among Indian adolescents. A lack of awareness about the risks further exacerbates the problem.²⁸

Healthcare system challenges: India's healthcare system, already burdened by high rates of respiratory diseases due to air pollution and traditional tobacco use, could face significant strain in managing an EVALI outbreak. The symptoms of EVALI—shortness of breath, chest pain, and hypoxemia—often mimic those of other lung diseases, complicating diagnosis and treatment.

Limited surveillance and research: Unlike the U.S., India lacks robust systems to monitor vaping-related illnesses. The absence of comprehensive data hampers the country's ability to anticipate and mitigate public health crises like EVALI.²⁸

Potential for adulterated products: With no regulatory oversight, illicit vaping products sold in India could contain dangerous additives like vitamin E acetate, the primary culprit in the U.S. EVALI outbreak.²⁹

ADDRESSING THE TICKING TIME BOMB

Strengthening PECA act enforcement and penalties

The prohibition of electronic cigarettes act (PECA), 2019, bans the production, sale, import, export, and advertisement of e-cigarettes in India. Strengthening the act requires stricter surveillance mechanisms, such as deploying dedicated law enforcement units to target illegal sales through online platforms and unregistered vendors. Increasing penalties for violations, including hefty fines and imprisonment, can serve as a deterrent. Regular audits of e-commerce platforms, combined with punitive actions, can curb the growing digital availability of these products.

Raising public awareness through targeted campaigns

Public awareness campaigns play a crucial role in preventing vaping, particularly among youth. Campaigns need to focus on the harmful effects of vaping, highlighting its association with conditions like EVALI. School and college programs targeting adolescents, supported by evidence-based educational materials, can dispel myths about vaping being a "safe" alternative to smoking. Leveraging social media platforms and influencer outreach can amplify these messages. Additionally, partnerships with media houses to air short films and public service announcements on vaping-related health risks can broaden public understanding.

Promoting research on e-cigarette use and its effects

India currently faces a gap in comprehensive data on e-cigarette usage patterns and associated health outcomes.

Promoting research is essential to understand the prevalence, motivators, and health impacts of vaping, particularly among youth. Government bodies, academic institutions, and private organizations should invest in longitudinal studies to monitor trends in vaping-related illnesses, including EVALI. Establishing dedicated research centres for tobacco alternatives and developing indigenous frameworks for toxicology studies on e-cigarette liquids could improve the country's preparedness for emerging vaping-related health issues.

Collaborative efforts: role of government, NGOs, and healthcare providers

The tobacco industry has created a deceptive allure. The government must spearhead policy enforcement and provide financial support for research and awareness initiatives. NGOs can bridge gaps by organizing community-level campaigns, providing educational resources, and advocating for stricter laws. Healthcare providers, on other hand, can play dual role in educating patients about the risks of vaping and training medical professionals to recognize and manage EVALI symptoms. Collaborations between these entities, supported by international organizations such as WHO, can lead to more effective strategies to combat vaping.

CONCLUSION

India faces a significant threat from a potential EVALI outbreak due to the rising prevalence of e-cigarette use, especially among its youth. Despite the implementation of the PECA act (2019), enforcement gaps and challenges in curbing illegal sales have allowed vaping to persist. Lessons from the U.S. highlight the critical need for stringent regulation, public education, and robust research to prevent a public health crisis. Strengthening enforcement, promoting awareness, and fostering collaboration among government bodies, NGOs, and healthcare providers are imperative to safeguard India's population. Proactive measures taken today can avert the looming danger of an EVALI epidemic, ensuring a healthier future for the nation.

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