Epidemiology and prevalence of lung disease amongst e-cigarette users in the USA - a national study

Naga Ganti*, Sudha Dirisanala, Srishti Laller, Inemesit Williams, Shafaq Taj, Kunwardeep Arora, Ayesha Hameed, Aasa D. Kuditipudi, Yadanar W. Lei, Nada Hammouda, Sachin Gupta, Thoyaja Koritala, Raghavendra Tirupathi**

* ; ** Department of Internal Medicine, Keystone Health, Chambersburg, PA, USA.

Introduction

❖ Electronic cigarettes (EC) are handheld devices which produce aerosols of nicotine and toxins like formaldehyde, acetaldehyde, acrolein, metallic nanoparticles etc. [1].

❖ The prevalence of vaping has increased gradually over the last five years, and it has become the most common way to consume nicotine among youth [2].

❖ EC mechanism of injury is due the effect of vapors at the cellular level. Elevated serum levels of the inflammatory biomarker YKL-40 and microparticles from vaping process are associated with inflammatory processes in the lungs followed by remodeling and fibrosis leading to decreased pulmonary function among chronic smokers [3,4]. DNA repair mechanisms are also damaged leading to cancer [5].

❖ In this study we aim to evaluate epidemiological characteristics and prevalence of lung disease amongst e-cigarette users in the USA.

Methods

❖ A population based, retrospective cross-sectional survey was performed using National Health and Nutrition Examination Survey (NHANES) of 2015-2018 [6].

❖ Adults using e-cigarettes, traditional smoking and dual smoking were identified and compared in their sociodemographic characteristics and prevalence of lung diseases.

❖ We used the chi-square test (categorical variables) and Mann–Whitney test and unpaired-student t test (continuous variables). p value <0.05 was used as a reference.

❖ Exclusion criteria: Respondents <18 years and missing data on demographics and outcomes.

Results

❖ Out of 178,157 respondents, 7745 (4.35%), and 48570 (27.26%) and 23444 (13.16%) were e-cigarette smokers, traditional smokers, and dual smokers, respectively.

❖ Prevalence of asthma was 15.16% and COPD was 4.26%.

❖ E-cigarette smokers were younger in comparison to traditional smokers [median: 25-years vs 62-years; p<0.0001]

Tables

Table 1: Characteristics of the E-cigarette and Traditional smokers in NHANES respondents [2015-2018]

Variable	E-cigarette N= 7756 (4.35%)	Traditional smoking N=48625 (27.27%)	Dual smoking N= 23444 (13.15%)	No smoking N= 98475 (55.23%) (control)	Total N= 178300 (100%)
Female	3827 (49.34)	18463 (37.97)	10023 (42.75)	61064 (62.01)	93377 (52.37)
18-44	7157 (92.28)	8909 (18.32)	13276 (56.63)	40120 (40.74)	69462 (38.96)
$100,000 and Over	1684 (23.97)	6944 (15.56)	2856 (13.01)	21912 (24.32)	33396 (20.40)
Mexican American	1537 (19.82)	6491 (13.35)	2543 (10.85)	16360 (16.61)	26931 (15.10)

Table 2: Concurrent prevalence of different smoking patterns and lung diseases [NHANES 2015-2018]

Variable	E-cigarette N= 7756 (4.35%)	Traditional smoking N=48625 (27.27%)	Dual smoking N= 23444 (13.15%)	No smoking N= 98475 (55.23%) (control)	Total N= 178300 (100%)	p-value
Asthma (%)	1634 (21.07)	7023 (14.44)	5260 (22.44)	13089 (13.29)	27006 (15.15)	<.0001
Asthma Median age in years (Q1-Q3)	7.0 (4.0-12.0)	25.0 (8.0-50.0)	12.0 (6.0-30.0)	15.0 (6.0-40.0)	-	<.0001
COPD (%)	15 (0.25)	3928 (8.10)	2330 (10.14)	1048 (1.11)	7321 (4.26)	<.0001

Results(c)

❖ In females [49.34% vs 37.97%], Mexican [19.82% vs 13.35%], annual household income above $100,000 [23.97% vs 15.56%], prevalence of e-cigarette smoking was higher in comparison to traditional smoking. (p<0.0001).

❖ The prevalence of COPD was higher amongst dual smokers in comparison to e-cigarette and traditional smoking [10.14% vs 0.25% vs 8.11%; p<0.0001].

❖ Prevalence of asthma was higher amongst dual and e-cigarette smokers in comparison with traditional smokers and non-smokers (22.44% vs 21.10% vs 14.46% vs 13.30%; p<0.0001)

Conclusion

❖ The prevalence of E-cigarette use was higher amongst the younger population, females and Mexican Americans.

❖ The increased prevalence of e-cigarette use in the youth could be explained by various factors including marketing, the use of different flavors and introduction of devices such as prefilled cartridges and high levels of nicotine.

❖ Public health measures can help to decrease the use of e-cigarette by regulating the industry and its marketing.

❖ Clinicians can also effectively engage with youth and their families and provide them with a safe environment to discuss the benefits and long-term effects of vaping.

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