



HHS Public Access

Author manuscript

J Community Health. Author manuscript; available in PMC 2024 December 01.

Published in final edited form as:

J Community Health. 2023 December ; 48(6): 1010–1014. doi:10.1007/s10900-023-01256-y.

E-cigarette Use Among Community-Recruited Adults with a History of Asthma in North Central Florida.

Andrew McCabe¹, Nicole Fitzgerald¹, Catherine Striley¹, Linda Cottler¹

¹Department of Epidemiology, College of Public Health and Health Professions, College of Medicine, University of Florida

Abstract

Background: Use of e-cigarettes have become an important public health concern in the US, particularly among those with health issues like asthma, which has remained high over the last decade. We examined associations between lifetime e-cigarette use and traditional cigarette use, cannabis use, and related health factors among community members with a history of asthma in North Central Florida.

Methods: Data came from HealthStreet, a University of Florida community engagement program. Adults with a history of asthma ($n=1,475$) were interviewed between 2014 and 2021. Bivariate and logistic regression analyses were conducted to examine differences between participants with and without a history of lifetime e-cigarette use.

Results: In this sample, lifetime prevalence of e-cigarette use was 19.9%. Over half of the sample reported ever smoking traditional cigarettes (54.4%) or cannabis (55.4%). Compared to those who identified as White, those who identified as Black/African American had lower odds for lifetime e-cigarette use (aOR=0.30, 95% CI: 0.22, 0.42). Those reporting lifetime traditional cigarette use (aOR=10.60, 95% CI: 6.93, 16.68) or cannabis use (aOR=1.81, 95% CI: 1.27, 2.61) had higher odds for reporting lifetime e-cigarette use.

Conclusions: Among a community sample of adults with asthma, nearly a fifth reported lifetime e-cigarette use. The use of e-cigarettes was most common among those with lifetime traditional cigarette use and cannabis use. Findings can inform prevention and intervention efforts in this population.

Keywords

e-cigarettes; cigarettes; asthma; smoking; cannabis

1.0 INTRODUCTION

Prevalence of electronic nicotine delivery system (ENDS, also known as e-cigarette) usage has increased dramatically in the US [1]. Between 2014 and 2018, reports of e-cigarette use

Corresponding Author: Andrew J. McCabe, amccabe7@ufl.edu; T: (352) 294-5953; Address: 2004 Mowry Rd, Gainesville, FL 32603, USA.

Statements and Declarations

The authors report no competing interests or funding.

increased by 46.2% among young adults (from 5.2% to 7.6%) while remaining stable among older adults (3.2%) [2-3]. Despite increased use, there is clear evidence that introducing foreign chemicals into the lungs via vaporization poses significant risks [4-6]. For instance, chemical agents are introduced as “flavors” in ENDS; the safety of these additives is likely to provide some damage to the lungs, although the extent of the damage from vaping is still an area of active research [7-8]. Poor health outcomes, including death, have been associated with ENDS use, especially among those with a history of preexisting lung damage, including from asthma (e.g. EVALI) [9-17]. Asthma, which is chronic disease of the lung and airways characterized by obstruction of airflow to the lungs, may worsen outcomes among smokers [18-19]. Although the literature assessing e-cigarette and cigarette smoking among individuals with asthma purports that individuals are replacing traditional cigarette smoking with e-cigarette smoking, negative health outcomes such as hospitalizations or deaths are still observed with e-cigarette use [20].

Despite the risks of vaping among those with asthma, little is known about factors leading to ENDS use in this population. In addition, little is known about differences by what is vaped or inhaled using an electronic delivery system. To add to the literature, we assessed differences in e-cigarette use, traditional cigarette use, cannabis use, and related health factors among a community-recruited sample of adults with a history of asthma.

2.0 METHODS

2.1 Sample

Data came from HealthStreet, the community engagement program of UF’s Clinical and Translational Science Institute (CTSI) that utilizes innovative methods to address disparities in healthcare access and outcomes in North Central Florida. Community health workers (CHWs) approach community members across in parks, grocery stores, at bus stops, laundromats, health fairs, malls, college campuses, or other local places where people congregate. Potential participants are given detailed information regarding the HealthStreet program, and those who provide written consent are interviewed by a CHW using a brief Health Needs Assessment (HNA) that covers health concerns, conditions, social determinants of care and care access. Based on their needs and choices, they are then linked to necessary health and social services in their community. Participants are also provided with information on studies for which they may be eligible and that might be relevant to their health history and concerns. For this analysis, the sample included 1,475 adults aged 18 or older in the HealthStreet registry who were recruited between 2014 and 2021 and identified having a history of asthma during their HNA intake. Approval for the HealthStreet program protocols and procedures was received from the University of Florida Institutional Review Board (IRB).

2.2 Measures

The HealthStreet HNA includes questions on health concerns and conditions, healthcare utilization, and sociodemographic information. Study participants were asked if they had ever in their lifetime smoked e-cigarettes, traditional cigarettes, and marijuana (cannabis) . They were also asked a series of health-related questions, including if they have ever been

told they had, or ever had, a problem with asthma. Only participants with a history of asthma were included in these analyses. Participants rated their general health as “excellent,” “good,” “fair,” or “poor.” They were also asked if they had seen a doctor for a past 12-month regular doctor’s visit, physical exam, or past 6-month ER visit, which were used to create a variable indicating whether or not they saw any physician in the past 12 months. For demographic characteristics, race was coded as “White,” “Black,” or “Other”; “Other” race included any other race not specified, which were combined due to low counts. Age was collected numerically, and sex was recorded as “male” or “female.”

2.3 Statistical Analyses

For bivariate analyses, χ^2 and *t*-tests were used to examine the associations between lifetime e-cigarette use and other factors. Adjusted logistic regression models were conducted to test for associations between e-cigarette smoking status while controlling for demographic and behavioral factors, including combustible tobacco use and cannabis use. All statistical analyses were conducted in R version 4.3.0 [18], with $p < 0.05$ considered statistically significant.

3.0 RESULTS

3.1 Sample characteristics and bivariate analyses

Table 1 displays characteristics of the sample. Among the 1,475 participants with a history of asthma, the mean age was 46.0 years ($SD=16.6$). The majority was female (72.2%); 47.7% identified as Black/African American and 43.5% identified as White. Almost all participants (91.5%) reported visiting a physician in the past 12 months, with 12.8% describing their general health as poor, 39.3% as fair, 39.3% as good, and 8.7% as excellent. Over half reported having ever smoked traditional cigarettes (54.5%) or cannabis (55.4%) in their lifetimes.

Overall, 19.9% ($n=294$) of participants with a history of asthma in this sample reported lifetime e-cigarette use. Compared to those who had never used e-cigarettes, a significantly greater proportion of those with lifetime e-cigarette use were male (33.7% vs. 25.7%, $p=.008$), identified as White (60.9% vs. 39.1%, $p<.001$), and reported ever using traditional cigarettes (88.8% vs. 46.0%, $p<.001$) or cannabis (80.6% vs. 49.1%, $p<.001$). Those with lifetime e-cigarette use were also significantly younger on average compared to those with no use (mean 40.2 years [$SD=14.6$] vs. mean 47.5 years [$SD=14.6$], $p<.001$).

3.2 Logistic regression

Results from the logistic regression analysis are shown in Table 2. The unadjusted models identified significant associations between lifetime e-cigarette use and sex, age, race, general health, lifetime cigarette use, and lifetime cannabis use. In the model adjusting for all covariates, sex and general health were no longer significant. Participants who identified as Black/African American had significantly lower odds of being lifetime e-cigarette users (adjusted odds ratio [aOR]=0.30, 95% CI: 0.22, 0.42), compared to participants who identified as White. Increasing age was associated with decreased odds of lifetime e-cigarette use (aOR=0.96, 95% CI: 0.95, 0.97). Those reporting lifetime traditional cigarette

use had the highest odds of lifetime e-cigarette use (aOR=10.60, 95% CI: 6.93, 16.68). Those reporting lifetime cannabis use also had significantly greater odds of lifetime e-cigarette use (aOR=1.81, 95% CI: 1.27, 2.61), though not as strong as for cigarette use.

4.0 DISCUSSION

This study of community-recruited adults with a history of asthma in North Central Florida identified several demographic and lifestyle factors associated with lifetime e-cigarette use. Participants who identified as Black/African American had lower odds of e-cigarette use as compared to those who identified as White, and increasing age was also associated with lower odds of use. The strongest observed associations were between lifetime traditional cigarette use, lifetime cannabis use, and lifetime e-cigarette use: those who reported ever having smoked traditional cigarettes were over 10 times as likely to have also used e-cigarettes, while those who reported ever having smoked cannabis were nearly two times as likely to have also used e-cigarettes.

Demographic factors associated with decreased odds of lifetime e-cigarette use included older age and race. For age, previous literature has shown that middle-aged adults do not significantly differ from younger adults in prevalence of e-cigarette use. However, older adults (adults aged 65 years or older) have been shown to have decreased rates of use [2]. Alternatively, older users may be less likely to adopt e-cigarette use. Considering this sample only included those with a history of asthma, these older adults may not have a clear understanding of the risks of e-cigarette use compared to traditional cigarette smoking. Regarding the finding that Black/African American participants were significantly less likely to report lifetime e-cigarette use compared to White participants, this association has also been observed in previous literature (not examining asthma), which has shown that Black individuals, on average, do not use e-cigarettes nearly as much as White individuals [19].

Individuals reporting lifetime traditional cigarette use and lifetime cannabis use were found to have substantially higher odds of lifetime e-cigarette use compared to those with no lifetime cigarette or cannabis use. The literature suggests that many smokers transition from smoking cigarettes (and/or cannabis) to e-cigarettes for a variety of reasons, including health (where e-cigarette use is seen as healthier) [20-21] or personal desire (where e-cigarette use is seen as desirable) [22-23]. Comorbid use of e-cigarettes as well as traditional cigarettes and/or cannabis, rather than transitioning from one substance to another, could also be explained by social and behavioral factors that lead to smoking in the first place, such as use among peer groups [24]. While temporality of this association cannot be established in this cross-sectional sample, these findings suggest that those with a history of smoking other substances—particularly traditional cigarettes—are more likely to also use e-cigarettes, which is significant given the health risks associated with smoking for those with asthma.

4.1 Limitations

This study is not without limitations. Data used in this analysis is cross-sectional in nature, which limits any assessment of temporality in lifetime e-cigarette, traditional cigarette, and cannabis use (e.g., we are unable to establish whether individuals first used other substances prior to the initiation of e-cigarette use). Given that substance use was measured

as lifetime use, we were also unable to assess quantity and frequency of use (e.g., whether the participant smoked once, occasionally, or frequently). Additionally, the sample used for this analysis was recruited primarily from areas in North Central Florida, which may limit the generalizability of findings if regional differences in asthma and e-cigarette use exist. Lastly, there may be other unmeasured variables not included in the analysis that may affect e-cigarette use. Future studies should aim to include more socioeconomic and demographic variables as well as a more geographically diverse sample.

4.2 Conclusions

Among a sample of community members with asthma, those with a history of traditional cigarette use and cannabis use were more likely to report e-cigarette use. It is recommended that healthcare professionals provide special care to this population and provide information about the risks of smoking with asthma.

Acknowledgements

Research reported in this manuscript was supported by funding from the National Institute of Drug Abuse of the National Institutes of Health under Award Number T32DA035167 (PI: Cottler) and by the University of Florida Clinical and Translational Science Institute, which is supported in part by the NIH National Center for Advancing Translational Sciences under Award Number UL1TR001427. The content is solely the responsibility of the author(s) and does not necessarily represent the official views of the National Institutes of Health.

Data availability statement

Data that supports the findings of the present study are available from the corresponding author upon reasonable request.

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Sample characteristics and bivariate analyses examining differences in lifetime e-cigarette use among persons with a history of asthma.

Table 1.

	Overall (n=1,475)	E-cigarette use		p-value
		Never (n=1,181)	Lifetime (n=294)	
Sex, n (%)				.008
Female	1,072 (72.2)	877 (74.3)	195 (66.3)	
Male	403 (27.3)	304 (25.7)	99 (33.7)	
Age				<.001
Mean (SD)	46.0 (16.6)	47.5 (14.6)	40.2 (14.6)	
Median [Min, Max]	48.0 [18.0, 92.0]	50.0 [18.0, 92.0]	38.5 [18.0, 78.0]	
Race, n (%)				<.001
White	641 (43.5)	462 (39.1)	179 (60.9)	
Black/African American	704 (47.7)	625 (52.9)	79 (26.9)	
Other race(s)	130 (8.8)	94 (8.0)	36 (12.2)	
Saw a physician in last 12 months, n (%)				.085
No	126 (8.5)	93 (7.9)	33 (11.2)	
Yes	1,349 (91.5)	1,088 (92.1)	261 (88.8)	
General Health, n (%)				.019
Poor	189 (12.8)	147 (12.4)	42 (14.3)	
Fair	579 (39.3)	463 (39.2)	116 (39.5)	
Good	579 (39.3)	480 (40.6)	99 (33.7)	
Excellent	128 (8.7)	91 (7.7)	37 (12.6)	
Lifetime traditional cigarette use, n (%)				<.001
No	671 (45.5)	638 (54.0)	33 (11.2)	
Yes	804 (54.5)	543 (46.0)	261 (88.8)	
Lifetime marijuana use, n (%)				<.001
No	658 (44.6)	601 (50.9)	57 (19.4)	
Yes	817 (55.4)	580 (49.1)	237 (80.6)	

Note. P-values are from χ^2 or t-testing. Significance is indicated by: * $p<.05$; ** $p<.01$; *** $p<.001$.

Table 2. Unadjusted and adjusted logistic regression models examining correlates of lifetime e-cigarette use.

	Unadjusted models		Adjusted model	
	OR	(95% CI)	aOR	(95% CI)
Sex				
Female (<i>ref.</i>)	<i>ref.</i>		<i>ref.</i>	
Male	1.46**	(1.11, 1.92)	1.05	(0.76, 1.45)
Age [18 – 92]	0.97***	(0.97, 0.98)	0.96***	(0.95, 0.97)
Race				
White (<i>ref.</i>)	<i>ref.</i>		<i>ref.</i>	
Black/African American	0.33***	(0.24, 0.43)	0.30***	(0.22, 0.42)
Other race(s)	0.99	(0.64, 1.49)	0.87	(0.53, 1.41)
Saw a physician in last 12 months				
No	1.48	(0.96, 2.23)	1.22	(0.73, 2.00)
Yes (<i>ref.</i>)	<i>ref.</i>		<i>ref.</i>	
General Health				
Poor	1.39	(0.92, 2.07)	1.30	(0.81, 2.07)
Fair	1.21	(0.90, 1.64)	1.17	(0.83, 1.65)
Good (<i>ref.</i>)	<i>ref.</i>		<i>ref.</i>	
Excellent	1.97**	(1.26, 3.04)	1.69	(0.99, 2.86)
Lifetime cigarette use				
No (<i>ref.</i>)	<i>ref.</i>		<i>ref.</i>	
Yes	9.29***	(6.45, 13.81)	10.60***	(6.93, 16.68)
Lifetime marijuana use				
No (<i>ref.</i>)	<i>ref.</i>		<i>ref.</i>	
Yes	4.31***	(3.18, 5.93)	1.81**	(1.27, 2.61)

Note. The adjusted model adjusts for all other variables simultaneously. Significance is indicated by: * $p < .05$; ** $p < .01$; *** $p < .001$