RESEARCH ARTICLE

Nicotine dependence and intention to quit among electronic, conventional and dual cigarette users in Karachi

Abeeha Batool Zaidi[1], Shiraz Shaikh[2]

Abstract

Objective: To compare nicotine dependence and intention to quit among different types of smokers.

Methods: The comparative cross-sectional study was conducted from November 2018 to October 2019 in Karachi after approval from the ethics review committee of the Jinnah Sindh Medical University, and comprised conventional, electronic and dual cigarette users. Data was collected using a structured questionnaire regarding socio-demographics, usage characteristics, and intention to quit. The validated Hooked on Nicotine Checklist was also used. Data was analysed using SPSS 22.

Results: Of the 246 subjects, 82(33%) were conventional cigarette users with a mean age of 27.41±8.7 years, 82(33.3%) were electronic cigarette users having mean age of 30.37±9.16 years, and 82(33.3%) were dual cigarette users with a mean age of 28.89±9.07 years. The use of electronic cigarette was more in people with higher age (p=0.01), married (p=0.001) and having higher income (p=0.05). Compared to conventional cigarette users, electronic cigarette users showed lower odds of high nicotine dependence (odds ratio: 0.38, 95% confidence interval: 0.18-0.80). No significant difference was observed in intention to quit among different types of cigarette users (p>0.05).

Conclusion: Electronic cigarettes users were comparatively less nicotine-dependent compared to the users of other types of cigarettes. Electronic cigarettes should only be recommended to conventional users with the intention to quit.

Keywords: Cigarette, Electronic, Nicotine dependence, Quit intention. (JPMA 72: 1766; 2022)

DOI: https://doi.org/10.47391/JPMA.4188

Introduction

Smoking is hazardous to health, and reducing tobacco use is a major public health concern.[1] It has been estimated that tobacco alone is responsible for the death of more than 8 million people annually. Of the 1.1 billion smokers worldwide, 80% belong to low- and middle-income countries (LMICs).[2] Globally, the use of electronic cigarette, or e-cigarette, is gaining popularity as a modern alternative despite mixed evidence on its potential as an aid for smoking cessation.[3]

Dependence on nicotine strongly contributes to high death rate of tobacco-associated diseases.[4] There is a belief that e-cigarettes are beneficial in the sense that the current users may switch from combustible smoke producing cigarettes to e-cigarettes as a harm-reduction substitute.[5] On the other hand, e-cigarette users have also reported symptoms of nicotine dependence.[6,7]

In Pakistan, e-cigarette is freely being marketed and promoted on social media as less harmful, and new brands are emerging at a fast pace. Since the government imposed a ban on water-pipe smoking, the dynamics of smoking has shifted from water-pipe smoking to e-cigarettes. The current study was planned to compare nicotine dependence and intention to quit between e-cigarette, conventional cigarette and dual users, and to identify factors associated with each of them.

[1]Department of Community Dentistry, Ziauddin College of Dentistry, Ziauddin University, Karachi, Pakistan; [2]APPNA Institute of Public Health, Jinnah Sindh Medical University, Karachi, Pakistan.

Correspondence: Abeeha Batool Zaidi. e-mail: zaidi.abeeha@gmail.com

Subjects and Methods

The comparative cross-sectional study was conducted from November 2018 to October 2019 in Karachi. After approval from the ethics review committee of the Jinnah Sindh Medical University (JSMU), Karachi, the sample size was calculated using OpenEpi calculator.[8] Keeping 95% confidence level, 80% power and 21.6% nicotine dependence in conventional cigarette smokers and increased dependence of odds ratio (OR) of 2.5 among dual cigarette users.[9] The required sample size was inflated by 10% to cover for non-response rate.

The sample was raised using non-probability, snowball sampling technique. Those included were conventional cigarette smokers, e-cigarette users and dual cigarette users aged 18 years and above. Conventional cigarette smokers were those using combustible smoke-producing cigarettes, e-cigarette users were people using nicotine-containing e-cigarettes of any form, and dual users were those consuming both the types, at least once a day for at least the preceding three months. Participants using any smoking cessation therapy, like nicotine gum, nicotine patches etc., were excluded.

After taking informed consent from all the participants, data was collected using a structured four-section questionnaire. The first section related to socio-demographic variables. The second section related to patterns of tobacco and cigarette use, duration and total nicotine intake measured in mg/day. The third part was about nicotine dependence which was measured using the Hooked on Nicotine Checklist (HONC) and it was classified as low and high based on median split (0-5 versus 6-10).[10] The fourth section assessed the intention to quit smoking.[11,12]

Data was analyzed using SPSS 22, and reported as percentages and frequencies or mean and standard deviation. Chi square and Kruskal-Wallis tests were applied to compare the characteristics of the three groups for categorical and continuous variables, respectively. Binary logistic regression was also used to determine relationships between different factors and high nicotine dependence and intention to quit smoking. Odds ratios (Ors) with 95% confidence intervals (CIs) were calculated. P<0.05 was considered statistically significant.

Results

Of the 246 subjects, 82(33%) were conventional cigarette users with a mean age of 27.41±8.7 years, 82(33.3%) were e-cigarette users having mean age of 30.37±9.16 years, and 82(33.3%) were dual cigarette users with a mean age of 28.89±9.07 years. The use of e-cigarette was more in people with higher age (p=0.01), married (p=0.001) and having higher income (p=0.05). The total nicotine intake was significantly (p=0.02) higher in e-cigarette users, but no significant difference was observed between cigarette type and duration of use (p=0.344). Besides, e-cigarette users showed significantly (p=0.003) low HONC scores compared to the others. Also, e-cigarette smokers 58(70.7%) had a higher proportion of those who had intention to quit compared to conventional 56(68.29%) and dual users 52(63.41%) (p>0.05). No significant difference was observed between quit attempts in the preceding three months, use of e-cig as cigarette cessation aid and type of cigarette user (Table 1).

Table-1: Characteristics of the study sample.

	Conventional Cigarette User (n=82)	**Electronic Cigarette** User (n=82)	**Dual cigarette User** (n=82)	***p*-value**
Mean Age* (years)	27.41 ±8.7	30.37 ±9.16	28.89 ±9.074	0.01
Education ** n (%)				
Undergraduate	33(40.2)	25(30.4)	23(28.4)	
Postgraduate	49(59.7)	57(69.5)	59(71.9)	0.213
Marital Status ** n (%)				
Unmarried	59 (72)	39 (47.6)	58 (70.7)	
Married	23 (28)	43 (52.4)	24 (29.3)	0.001
Occupation** n (%)				
Student	31(37.8)	19(23.2)	24(29.3)	
Business	17(20.7)	25(30.5)	7(8.5)	
Job employee	34(41.5)	38(46.3)	51(62.2)	0.02
Ethnicity** n (%)				
Urdu	39(47.6)	43(52.4)	34(41.5)	
Other	43(52.4)	39(47.6)	48(58.5)	0.370
Income* in PKR- (n=203)				
Mean±SD	342169.23±674455.99	378802.82±465586.009	271462.69±246571.60	0.051
Median	150000	250000	200000	
Nicotine Intake* (mg/day)				
Mean±SD	21.04±24.17	40.84±50.82	34.00±58.39	0.001
Median (IQR)	15 (14.88)	27.5 (27.58)	24 (23.38)	
Duration of cigarette use* (years)				0.344
Mean±SD	9.4±8.25	10.7±8.7	10.68±7.7	
Median (IQR)	7.5 (9)	10 (13.25)	10 (11)	
Duration of cigarette use* (years)				
Mean±SD	9.4±8.25	10.7±8.7	10.68±7.7	0.344
Median (IQR)	7.5 (9)	10 (13.25)	10 (11)	
HONC* Score				0.003
Mean±SD	6.34±2.704	4.87±2.67	5.20±3.29	
Intention to Quit ** n (%)	56 (68.2)	58 (70.7)	52 (63.4)	0.595
Quit attempts in last 3 months** n (%)	28 (34.1)	27 (32.9)	23 (40.2)	0.578
Use of e-cig as cigarette cessation aid** n (%)	NA	67 (81.7)	57 (69.5)	0.06

*Kruskal-Wallis Test; **Chi-square test ;† p-value < 0.05 was considered significant. SD: Standard deviation, IQR: Interquartile range, HONC: Hooked on Nicotine Checklist.

Table-2: Relationship of nicotine dependence with different factors (n=246).

Variable	Nicotine Dependence (low* vs high)	
	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Type of Smoker		
Conventional	1.00	1.00
Electronic	0.55 (0.29-1.03)	0.38 (0.18-0.80)
Dual	0.52 (0.31-1.08)	0.55 (0.27-1.12)
Age (years)		
18-24	1.00	1.00
25-30	0.42 (0.22-0.78)	0.51 (0.21-1.23)
31 and above	0.73 (0.39-1.35)	1.39 (0.47 -4.12)
Education		
Undergraduate	1.00	1.00
Graduation and above	0.74(0.432-1.255)	0.88(0.44-1.76)
Occupation		
Student	1.00	1.00
Business	0.91(0.44-1.89)	0.97(0.38-2.56)
Job Employee	0.45(0.25-0.81)	0.45(0.19-1.03)
Ethnicity		
Urdu	1.00	1.00
Other Languages	0.77(0.47-1.28)	0.74 (0.42-1.31)
Marital Status		
Unmarried	1.00	1.00
Married	0.85(0.51-1.43)	1.10(0.54-2.27)
Nicotine Intake (mg/day)		
Low (0.75-12)	1.00	1.00
Moderate (13-30)	2.75 (1.44-5.12)	3.03 (1.52-6.02)
High (31-500)	2.51 (1.34-4.71)	3.55 (1.71-7.39)
Duration of Use (Years)		
0-5	1.00	1.00
6-13	1.33 (0.73-2.44)	1.74 (0.85-3.54)
14 and above	0.82 (0.44-1.53)	0.78 (0.31-1.94)

Low dependence was kept as reference category; Binary regression was used.
OR: Odds ratio, CI: Confidence interval.

Table-3: Relationship of intention to quit smoking with different factors (n=246).

Variable	Intention to Quit	
	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Type of Smoker		
Conventional	1.00	1.00
Electronic	1.12 (0.58-2.18)	0.96(0.46-2.01)
Dual	0.81 (0.42-1.54)	0.67(0.33-1.36)
Age (years)		
18-24	1.00	1.00
25-30	1.09(0.57-2.05)	1.04 (0.44-2.47)
31 and above	1.36(0.70-2.61)	1.00 (0.34-2.95)
Education		
Graduate	1.00	1.00
Above graduate	1.15(0.65-2.01)	1.03(0.52-2.07)
Occupation		
Student	1.00	1.00
Business	0.64 (0.30-1.35)	0.37 (0.41-0.99)
Job Employee	1.21 (0.65-2.3)	0.91 (0.38-2.17)
Ethnicity		
Urdu	1.00	1.00
Other Languages	0.76 (0.44-1.30)	0.87 (0.49-1.54)
Marital Status		
Unmarried	1.00	1.00
Married	1.68 (0.94-2.98)	1.92 (0.91-4.01)
Nicotine Intake (mg/day)		
Low (0.75-12)	1.00	1.00
Moderate (13-30)	1.78(0.92-3.42)	1.87 (0.95-3.70)
High (31-500)	1.51(0.79-2.86)	1.71 (0.85-3.46)
Duration of Use (Years)		
0-5	1.00	1.00
6-13	1.21 (0.64-2.30)	1.17 (0.58-2.38)
14 and above	1.28 (0.66-2.46)	1.08 (0.44-2.68)

*Binary logistic regression was used. OR: Odds ratio, CI: Confidence interval.

Compared to conventional cigarette users, electronic cigarette users showed lower odds of high nicotine dependence (OR: 0.38, 95% CI: 0.18-0.80). Compared to low nicotine intake, moderate and high nicotine intake showed higher odds for high nicotine dependence (adjusted OR [AOR] =3.03, 95% CI: 1.52-6.02) and (AOR: 3.55, 95% CI: 1.70-7.38) respectively. Age, education, ethnicity, marital status and duration of cigarette use did not show any significant association with high nicotine dependence (Table 2).

After adjustment for all confounders, no significant difference was observed in intention to quit among different types of cigarette users (p>0.05) (Table 3).

Discussion

The use of electronic cigarette was more among people with higher age, married and people with higher income. Literature also suggests its greater use by higher socioeconomic class.[13]

Results showed that nicotine intake per day was the highest in e-cigarette users with least nicotine dependence. This result is consistent with a study conducted in the general population of Switzerland in which e-cigarette users were also found less dependent compared to conventional cigarette users.[14] In contrast, a study conducted among college students of South Korea showed that dual users were more nicotine-dependent compared to conventional cigarette users.[15] The possible reason for this may be due to the fact that study was conducted only on college students, and different operational definitions were used to classify smokers. They classified conventional cigarette users as daily conventional cigarette users who also used e-cigarettes less than three times per week, and dual users as daily conventional cigarette smokers who also used e-cigarettes regularly at least three times per week.[15]

The current results showed less dependence among e-cigarette users whose nicotine intake was found to be the highest. There was a positive relationship of nicotine dependence with greater nicotine intake. This shows that the amount of nicotine intake may not be the only factor responsible for dependence, and nicotine delivery to the

bloodstream is also important in determining dependence. Nicotine from tobacco smoke is rapidly absorbed into the systemic circulation after cigarette use and is quickly carried to various body organs, including the brain. Moreover, a single use of tobacco nicotine remains in the body for 8-12 hours. Whereas, e-cigarettes deliver nicotine at a much lower rate. A study reported e-cigarettes (18mg/ml) deliver only one-third to one-fourth the amount of nicotine after 5 minutes of use compared to conventional cigarettes.[16] The other possible reason for less dependence may be that e-cigarettes are used more frequently throughout the day, resulting in continued exposure and less experience of symptoms of withdrawal.

Although the current study did not find any significant association of intention to quit cigarette with the type of cigarette use, odds suggested that e-cigarette users had lower intention to quit compared to conventional cigarette users. The finding is in line with systematic review and meta-analysis showing significantly lower likelihood of intention to quit among e-cigarette users compared to those who did not use e-cigarettes.[17] Also, no association was being found between e-cigarette use and quitting in longitudinal population-based studies.[18,19] Alternatively, in one study smokers intending to quit were more likely to be e-cigarette users than those not intending to quit.[20] The current results also indicated that more than 80% of e-cigarette users were using it as smoking cessation aid, and 70.7% had the intention to quit cigarette use, but it is alarming that only 32.9% of e-cig users reported that they tried to quit in the preceding three months. Since e-cigarettes were being used as smoking cessation aid by majority of study population, users also had less intention to quit cigarette. This suggests that e-cigarettes were helpful in quitting conventional smoking, but to quit the use of e-cigarette itself became a new challenge.

According to a study, the common reasons for quitting e-cigarette use were either the users were just experimenting, using e-cigarette did not actually feel like cigarette, or people did not like the taste of e-cigarette.[21]

Finally, in comparison to students, businessmen were less intended to quit, which may be because of other reasons, like increased mental stress and workload. A study has also shown association between higher stress scores and increased odds of conventional cigarette smoking, e-cigarette use and water-pipe use.[22]

The current study has some limitations. First, e-cigarettes are advanced devices equipped with high-tech features, and some people were using certain devices which could control power output, and increasing the power output may result in increase in nicotine yield, which has not been captured in the study. Second, a cross-sectional study design provides evidence at a certain point in time, and a longitudinal study would have been able to better understand the different stages of e-cigarette use and nicotine dependence. Third, this study has only captured male representation because of female less e-cigarette use and low responses rate.

In the light of the findings, the current study proposes that e-cigarette should not be recommended to anyone who has never smoked before as its nicotine intake is quite high and can lead to dependence. The use of e-cigarette may be encouraged as smoking cessation aid, but regular follow-up and vigilance should be kept and nicotine intake shall be gradually tapered off. In Pakistan, there is no specific policy targeting e-cigarettes regulation. The policy-makers should introduce strict fines against people promoting e-cigarette among non-smokers.

Conclusion

The use of e-cigarette is less nicotine-dependent, but quitting e-cigarette use is not easy after switching from conventional cigarettes. Therefore, e-cigarette use is an emerging public health challenge as giving up on one addiction may lead to another addiction.

Disclaimer: The text is based on an academic thesis.

Conflict of Interest: None.

Source of Funding: Jinnah Sindh Medical University, Karachi.

References

1. National Center for Chronic Disease Prevention and Health Promotion (US) Office on Smoking and Health. The Health Consequences of Smoking—50 Years of Progress: A Report of the Surgeon General. Atlanta, GA: Centers for Disease Control and Prevention (US); 2014.
2. World Health Organization. Tobacco fact sheet. News release. The WHO Media Center. [Online] 2019 [Cited 2020 March 04]. Available from URL: https://www.who.int/news-room/fact-sheets/detail/tobacco
3. Cobb CO, Hendricks PS, Eissenberg T. Electronic cigarettes and nicotine dependence: evolving products, evolving problems. BMC Med 2015;13:119. doi: 10.1186/s12916-015-0355-y.
4. Zhu J, Nelson K, Toth J, Muscat JE. Nicotine dependence as an independent risk factor for atherosclerosis in the National Lung Screening Trial. BMC Public Health 2019;19:103. doi: 10.1186/s12889-019-6419-8.
5. Farsalinos KE, Polosa R. Safety evaluation and risk assessment of electronic cigarettes as tobacco cigarette substitutes: a systematic review. Ther Adv Drug Saf 2014;5:67-86. doi: 10.1177/2042098614524430.
6. Case KR, Mantey DS, Creamer MR, Harrell MB, Kelder SH, Perry CL. E-cigarette- specific symptoms of nicotine dependence among Texas adolescents. Addict Behav 2018;84:57-61. doi: 10.1016/j.addbeh.2018.03.032.

7. Johnson JM, Muilenburg JL, Rathbun SL, Yu X, Naeher LP, Wang JS. Elevated Nicotine Dependence Scores among Electronic Cigarette Users at an Electronic Cigarette Convention. J Community Health 2018;43:164-74. doi: 10.1007/s10900-017-0399-3.
8. Dean AG, Sullivan KM, Soe MM. OpenEpi: Open Source Epidemiologic Statistics for Public Health, Version 3.01. [Online] 2013 [Cited 2022 March 28]. www.OpenEpi.com.
9. Post A, Gilljam H, Rosendahl I, Bremberg S, Galanti MR. Symptoms of nicotine dependence in a cohort of Swedish youths: a comparison between smokers, smokeless tobacco users and dual tobacco users. Addiction 2010;105:740-6. doi: 10.1111/j.1360-0443.2009.02852.x.
10. Carpenter MJ, Baker NL, Gray KM, Upadhyaya HP. Assessment of nicotine dependence among adolescent and young adult smokers: a comparison of measures. Addict Behav 2010;35:977-82. doi: 10.1016/j.addbeh.2010.06.013.
11. Fagerström KO. Measuring degree of physical dependence to tobacco smoking with reference to individualization of treatment. Addict Behav 1978;3:235-41. doi: 10.1016/0306-4603(78)90024-2.
12. Wheeler KC, Fletcher KE, Wellman RJ, Difranza JR. Screening adolescents for nicotine dependence: the Hooked On Nicotine Checklist. J Adolesc Health 2004;35:225-30. doi: 10.1016/j.jadohealth.2003.10.004.
13. Brown J, West R, Beard E, Michie S, Shahab L, McNeill A. Prevalence and characteristics of e-cigarette users in Great Britain: Findings from a general population survey of smokers. Addict Behav 2014;39:1120-5. doi: 10.1016/j.addbeh.2014.03.009.
14. Etter JF, Eissenberg T. Dependence levels in users of electronic cigarettes, nicotine gums and tobacco cigarettes. Drug Alcohol Depend 2015;147:68-75. doi: 10.1016/j.drugalcdep.2014.12.007.
15. Oh H, Im B, Seo W. Comparisons of the stages and psychosocial factors of smoking cessation and coping strategies for smoking cessation in college student smokers: Conventional cigarette smokers compared to dual smokers of conventional and e-cigarettes. Jpn J Nurs Sci 2019;16:345-54. doi: 10.1111/jjns.12241.
16. Farsalinos KE, Spyrou A, Tsimopoulou K, Stefopoulos C, Romagna G, Voudris V. Nicotine absorption from electronic cigarette use: comparison between first and new-generation devices. Sci Rep 2014;4:4133. doi: 10.1038/srep04133.
17. Kalkhoran S, Glantz SA. E-cigarettes and smoking cessation in real-world and clinical settings: a systematic review and meta-analysis. Lancet Respir Med 2016;4:116-28. doi: 10.1016/S2213-2600(15)00521-4.
18. Adkison SE, O'Connor RJ, Bansal-Travers M, Hyland A, Borland R, Yong HH, et al. Electronic nicotine delivery systems: international tobacco control four-country survey. Am J Prev Med 2013;44:207-15. doi: 10.1016/j.amepre.2012.10.018.
19. Vickerman KA, Carpenter KM, Altman T, Nash CM, Zbikowski SM. Use of electronic cigarettes among state tobacco cessation quitline callers. Nicotine Tob Res 2013;15:1787-91. doi: 10.1093/ntr/ntt061.
20. Rutten LJ, Blake KD, Agunwamba AA, Grana RA, Wilson PM, Ebbert JO, et al. Use of E-Cigarettes Among Current Smokers: Associations Among Reasons for Use, Quit Intentions, and Current Tobacco Use. Nicotine Tob Res 2015;17:1228-34. doi: 10.1093/ntr/ntv003.
21. Pepper JK, Ribisl KM, Emery SL, Brewer NT. Reasons for starting and stopping electronic cigarette use. Int J Environ Res Public Health 2014;11:10345-61. doi: 10.3390/ijerph111010345.
22. King JL, Reboussin BA, Spangler J, Cornacchione Ross J, Sutfin EL. Tobacco product use and mental health status among young adults. Addict Behav 2018;77:67-72. doi: 10.1016/j.addbeh.2017.09.012.