Preventive Medicine Reports 10 (2018) 332–336

Contents lists available at ScienceDirect

Preventive Medicine Reports

journal homepage: www.elsevier.com/locate/pmedr

Beliefs and behavior regarding e-cigarettes in a large cross-sectional survey

Sébastien Couraud[a,*], Alexis B. Cortot[b], Xavier B. Pivot[c], Chantal Touboul[d], Christine Lhomel[e], Jean-Yves Blay[f], François Eisinger[g,h], Jérôme Viguier[i], Jean-François Morère[j], Laurent Greillier[k]

[a] Department of Respiratory Diseases and Thoracic Oncology, Centre Hospitalier Lyon Sud, Cancer Institute of Hospices Civils de Lyon, 165 chemin du Grand Revoyet, 69495 Pierre Bénite Cedex, France
[b] Department of Respiratory Diseases and Thoracic Oncology, Hôpital Calmette, Bd du Professeur Jules Leclercq, 59000 Lille, France
[c] Centre de lutte contre le cancer Paul Strauss de Strasbourg, Hôpitaux Universitaires de Strasbourg, 3 Rue de la Porte de l'Hôpital, 67 065 Strasbourg Cedex, France
[d] KantarHealth, 3 avenue Pierre Masse, 75014 Paris, France
[e] Department of Oncology and Hematology, Roche SAS, 30 cours de l'île Seguin, 92650 Boulogne-Billancourt, France
[f] University Claude Bernard Lyon I, Centre, Léon Bérard, 28 rue Laennec, 69008 Lyon, France
[g] Aix Marseille University, INSERM, SESSTIM, 13006 Marseille, France
[h] Institut Paoli-Calmettes (DASC), 232 boulevard Sainte Marguerite, BP 156 13273 Marseille Cedex 9, France
[i] Coordination Center for Cancer Screening, Hôpital Bretonneau, 2 boulevard Tonnellé, 37044 Tours Cedex 9, France
[j] Department of Oncology-Hematology, Hôpital Paul Brousse, U1193-Paris 11, 12 avenue Paul Vaillant Couturier, 94804 Villejuif, France
[k] Aix Marseille University, Assistance Publique-Hôpitaux de Marseille, Department of Multidisciplinary Oncology and Therapeutic Innovations, Chemin des Bourrely, 13915 Marseille Cedex 20, France

ARTICLE INFO

Keywords:
Electronic cigarettes
Smoking cessation
Tobacco use
Lung neoplasms
Pulmonary disease
Risk factors
Smoke

ABSTRACT

Although e-cigarette use is increasing dramatically, numerous concerns persist regarding toxicity and their role in smoking cessation. We assessed beliefs and behavior regarding e-cigarettes in an adult French population.

The 4th French nationwide observational survey, EDIFICE 4, was conducted among representative samples of 1602 laypersons (age, 40–75 years) from 12 June-10 July 2014, using the quota method. Profile, beliefs and behavior were assessed by phone interviews of the participating lay population with no history of cancer (N = 1463). Tobacco use, nicotine dependence (Fagerström test) and e-cigarette use were assessed.

E-cigarette users represented 6% of the study lay population. E-cigarette users regarded e-cigarettes as helpful for quitting tobacco smoking and reducing the risk of lung cancer. Current dual users (e-cigarettes + cigarettes) were more likely to attempt to quit than current exclusively cigarette smokers (odds ratio, 3.15 [1.74–5.70]), and to consider themselves at higher risk for lung cancer (OR 3.85 [2.47–5.99]). They also considered e-cigarette vapor to be less toxic than tobacco smoke in terms of both active and passive exposure.

Dual users typically consider themselves at higher risk for cancer and intend to quit smoking. Physicians should be made aware of this specific sub-population for whom e-cigarettes may be a useful trigger in the smoking cessation process.

1. Introduction

The use of e-cigarettes has increased dramatically in recent years. Use by both adolescents and adults doubled worldwide between 2008 and 2012 (FCTC WHO Framework Convention on Tobacco Control, 2014). In 2014, there were three million users in France i.e., 6% of the French population (Andler et al., 2016).

However, the role of e-cigarettes in facilitating smoking cessation or in lowering the social stigma attached to tobacco use remains controversial (Cressey, 2013; Cressey, 2014; Editorial, 2014; Polosa, 2015; Bullen et al., 2013). A number of studies have assessed the toxicity of e-cigarettes (Scheffler et al., 2015; Sussan et al., 2015; Marco and Grimalt, 2015; Goniewicz et al., 2014; Nutt et al., 2014) and several reviews (Hajek et al., 2014; McNeill et al., 2015; Callahan-Lyon, 2014; Pisinger and Dossing, 2014; Dinakar and O'Connor, 2016; McRobbie et al., 2014) have attempted to establish a consensus with regard to management of e-cigarette consumption. The main conclusions are that e-cigarettes contain smaller quantities of toxic substances and in lower concentrations than tobacco cigarettes. However, in the absence of evidence-based proof of non-toxicity, expert guidelines from both the

* Corresponding author.
E-mail addresses: sebastien.couraud@chu-lyon.fr (S. Couraud), alexis.cortot@chru-lille.fr (A.B. Cortot), xavier.pivot@univ-fcomte.fr (X.B. Pivot), chantal.touboul@kantarhealth.com (C. Touboul), christine.lhomel@roche.com (C. Lhomel), jean-yves.blay@lyon.unicancer.fr (J.-Y. Blay), eisingerf@ipc.unicancer.fr (F. Eisinger), jviguier@institutcancer.fr (J. Viguier), jean-francois.morere@pbr.aphp.fr (J.-F. Morère), laurent.greillier@ap-hm.fr (L. Greillier).

https://doi.org/10.1016/j.pmedr.2018.04.009
Received 19 October 2017; Received in revised form 5 April 2018; Accepted 12 April 2018
Available online 18 April 2018

WHO (FCTC WHO Framework Convention on Tobacco Control, 2014) and French institutions (Office français de prévention du tabagisme (OFT), 2013; Haute autorité de santé (HAS), 2014) all recommend a precautionary approach.

Whether e-cigarettes are useful in the cessation of tobacco use or whether they are actually associated with a lower rate of tobacco cessation among smokers is unknown and contradictory findings have emerged (Rahman et al., 2015; Kalkhoran and Glantz, 2016). Nicotine-containing e-cigarettes have been shown to be effective for reducing consumption or delaying relapse (Bullen et al., 2013; Rahman et al., 2015; Siegel et al., 2011; Farsalinos et al., 2014; Etter and Bullen, 2014; Caponnetto et al., 2013; Adriaens et al., 2014). Recent findings have however shown that e-cigarette use in younger adults is associated with a significantly higher risk of becoming a (cigarette) smoker (Miech et al., 2017; McCabe et al., 2017).

Attempts have been made to define the profile of ever-users of e-cigarettes (Huang et al., 2016; Pineiro et al., 2016). These surveys did not however assess beliefs or knowledge among the general population with regard to the risks of exposure to or the potential harm or benefits of e-cigarettes vs. conventional cigarettes. To the best of our knowledge, the links between nicotine dependence and the use of e-cigarettes have seldom been addressed (Gonzalez Roz et al., 2017).

We investigated beliefs and behaviors regarding e-cigarettes in an adult French population.

2. Methods

The aim of the EDIFICE nationwide observational surveys is to improve insight into the behavior of the French population with regard to cancer prevention and participation in screening programs. They are conducted in the target populations for national screening programs, i.e., age range, 40 to 75 years. EDIFICE 4 was conducted by phone interviews from June 12 to July 10, 2014 among a selected population of 1602 individuals. Representativeness of the survey sample for gender, age, profession, geographical area and community size as compared to the French general population, was ensured by the method of quotas (Deville, 1991), based on the statistics of the French Employment Survey conducted in 2009 and updated in 2011 by the French National Institute for Statistics and Economic Studies (*Institut National de Statistiques et d'Etudes Economiques* [INSEE]). Phone interviews were conducted by experienced independent interviewers using a computer-assisted questionnaire. The present analysis focuses on individuals with no history of cancer ($N = 1463$).

All interviewees provided information on sociodemographic characteristics and answered questions about their beliefs and knowledge of e-cigarette use and related risks. They were also asked about smoking habits, including cigarettes, cigars and pipe. For the sake of simplicity, and also because there were very few cigar-only or pipe-only smokers in our sample, we have used the term “cigarette-smoker” to refer to all types of inhaled tobacco products, cigars and pipe included.

We defined three categories of cigarette (and cigar and pipe) users according to the questionnaire answers: (i) never-smokers (individuals who have smoked < 100 cigarettes throughout their lifetime (Couraud et al., 2012)); (ii) former smokers (individuals who quit smoking at least one year ago and who have smoked > 100 cigarettes throughout their lifetime); and (iii) current smokers (individuals who currently smoke or quit less than one year prior to the interview). For e-cigarettes, we defined two categories: e-cigarette users (currently using e-cigarettes at the time of the survey) and e-cigarette non-users (not currently using e-cigarettes). Of note, former e-cigarettes users were categorized as non-users. The following categories of cigarette smokers and e-cigarette users were therefore used: exclusively cigarette smokers (current or former), dual users (current simultaneous cigarette smoking and e-cigarette use) and e-cigarette users only (not currently cigarette smokers).

Nicotine dependence was assessed using the Fagerström Test for Cigarette Dependence (FTCD) (Heatherton et al., 1991) among interviewees who reported current cigarette use. All interviewees were asked about their perception of the risk of lung cancer for themselves and for others. Individual awareness of the risk of lung cancer was assessed by the question: “How do you evaluate your own risk of lung cancer? Is it higher, lower or identical to that of the average population?”

Comparisons between two populations were made using Student's *t*-test for quantitative data, and the *Z*-test and the chi-squared test for the comparison of percentages and numbers, respectively, in the case of categorical data. Differences were considered statistically significant when the probability value was < 0.05 (bilateral test). The detailed methodology of these iterative surveys has been described previously (Roussel and Touboul, 2011).

3. Results

3.1. Demographics

The demographics of the study population of 1463 individuals with no history of cancer together with tobacco status and e-cigarette use are presented in Table 1. Exclusively cigar-smokers or exclusively pipe-smokers represented 3% (10/353) and 1.5% (5/353) of the current smokers in the lay population, respectively.

3.2. E-cigarette use in the lay population

Of the total study population, 6% ($N = 93$) reported using e-cigarettes. The majority were currently dual users ($N = 74$, 5%), and 1% were former cigarette smokers ($N = 19$) (Table 1). All current e-cigarette users had a personal history of cigarette smoking (Fig. 1).

The profile of e-cigarette users in the lay population are reported in Table 1. For 82%, e-cigarettes were a substitute for conventional

Table 1
Characteristics, smoking status and e-cigarette use in lay population.

Variable N(%)	Lay population
	N = 1463 (100%)
Gender	
Male	726 (50%)
Female	737 (50%)
Socioeconomic category*	
SPC+	468 (32%)
SPC-	438 (30%)
Unemployed (inc. retired)	557 (38%)
Smoking status (cigarettes, cigars, pipes)	
Never-smokers	625 (43%)
Former smokers	481 (33%)
Current smokers	353 (24%)
Missing data	4 (< 1%)
Mean pack-year consumption (cigarette; SD)	
Current smokers	14.80 (13.31)
Former smokers	21.33 (21.87)
Intention to quit cigarette	195 (55%)
E-cigarette users	
All	93 (6%)
Only e-cigarettes	19 (1%)
Dual users	74 (5%)
E-cigarette use	**N = 93 (100%)**
Average times per day (SD)	9.9 (11.0)
Nicotine-containing liquid	81 (88%)
Methods of use	
Substitute for conventional cigarettes	76 (82%)
Concomitantly with conventional cigarettes	17 (18%)
Reasons for using e-cigarettes:	
To quit smoking	64 (69%)
To reduce tobacco consumption	22 (24%)
Neither of these	6 (7%)

* Socioprofessional category, high (SPC+) and low (SPC-).