



Editorial

Vaping With or Without Nicotine is Always Addictive

Los cigarrillos electrónicos, con y sin nicotina, son adictivos



Currently, new forms of tobacco and nicotine consumption are the main challenge in our quest for achieving global tobacco control.¹ The increase in promotion, advertising, sales, distribution and uncontrolled use of these new forms are the principal reasons for the unstoppable growth in the use of electronic cigarettes (EC) in all countries. In Spain, data from the latest EDADES and ESTUDES surveys clearly indicate that the use of these devices, in any type of measurement (ever in a person's life, in the last 12 months, in the last 30 days and daily) has doubled or even quadrupled in the last 6 years, both among adolescents and adults.^{2,3} EDADES 2024 survey shows that e-cigarette use among Spanish adults (as measured by consumption in the last 30 days) increased from 1.5% in 2018 to 4.6% in 2024. Data from ESTUDES 2023 survey showed that these figures for young Spaniards were 14.9% and 26.3% in 2019 and 2023, respectively.^{2,3} It should be noted that the use of EC without nicotine is increasing even more rapidly than that of those with nicotine: while in the 2022 EDADES survey, 75% of vapers used EC with nicotine were, in the 2024 survey, the figure dropped to 54%.³ Regarding epidemiological data from other countries, the results from the TACKSHS survey conducted in 12 European countries are very revealing: more than 8.3 million people use EC in these countries and many of these people use them in smoke-free areas.⁴

There are enough reasons to affirm that EC, with and without nicotine, are capable of causing dependence and addiction. Nicotine exerts its addictive capacity because its use by inhalation, as is the case with EC, produces an activation of the different neurophysiological pathways involved in the development of dependence. The activation of these pathways leads to an increase in the release of dopamine in the Nucleus Accumbens and of norepinephrine in the Locus Coeruleus. The increased concentration of these neurotransmitters in these locations is the main cause of the production of dependence and addiction to nicotine.⁵ Furthermore, the inhalation mechanism itself and the gestural and environmental modifications associated with the use of EC also play a fundamental role in the development and maintenance of this dependence.⁵ Below are some relevant data that complete this information.

A recent study has shown that the average plasma nicotine level of 109 vapers after a day of regular use of their EC was 9.91 ng/ml.⁶ Moreover, it has also been found that the average blood nicotine level of 30 vapers before starting to use an EC was 2.3 ng/ml and that it increased to 12.7 ng/ml immediately after consumption.⁷ It

is known that these blood nicotine levels are capable of activating the neurophysiological pathways that create dependence. Furthermore, recent studies have indicated that the type of nicotine salt used in EC, i.e. nicotine pyruvate, is absorbed in greater quantities than the nicotine in conventional cigarettes and that its absorption is smooth and does not irritate the oropharyngeal mucosa.⁸

It must be noted that the mechanisms of nicotine addiction are not only activated by nicotine itself but can be increased by other non-nicotine substances also present in EC such as thickeners and colorants that are capable of stimulating oropharyngeal nerve endings and thus contribute to a greater release of dopamine in the Nucleus Accumbens.⁹ Even the use of flavorings and aromatizers in EC liquids contribute to this greater release of dopamine by stimulating taste and smell nerve endings.¹⁰

It is well known that the gestural dependence of conventional cigarette users on them is a way of maintaining and increasing nicotine addiction. Studies show that hand-mouth movements are much more frequent in EC users than in conventional cigarette smokers, and that smoke expulsion is much more intense in EC users than in smokers of conventional cigarettes.¹¹

Taking into account these data, the results of the meta-analysis carried out by Butler et al. are explainable: they studied the prevalence of EC use for more than 6 months in 7787 subjects who had used them to quit smoking in 19 studies. They found that prevalence ranged from 54% to 70% and that there were no significant differences between the use of EC with or without nicotine, RR: 1.15 (95% CI: 0.94–1.41).¹²

Many data from daily clinical practice indicate that the use of EC causes dependence and addiction. The development of specific questionnaires to measure the degree of dependence of vapers.¹³ PS-ECDI (Penn State Electronic Cigarette Dependence Index) is an e-cigarette modification of Penn State Nicotine Dependence Index. The scale contains 10 questions measuring different dependence constructs such as: time to first cigarette, number of times vaping per day, craving rating, irritability, and waking up at night to vape. A final score of 13 or more indicates a high level of dependence.¹³ Also, it is important to highlight that several controlled and randomized clinical trials have been conducted to measure the efficacy and safety of drugs that are normally used to quit smoking, such as medications to stop vaping.^{6,14} Finally, it should be pointed out that several medical scientific societies have endorsed recommendations for assessment and therapeutic approach to vapers.¹⁵

In conclusion, the analysis epidemiological, biochemical, neurophysiological, and clinical data on EC users indicates that the vast majority of them suffer from nicotine dependence and addiction; and that this data is evident even in those who use nicotine-free EC.

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