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Editorial

In relation to the recent World No Tobacco Day, can electronic cigarettes affect our general and mental health?☆



Con respecto al día mundial sin tabaco, ¿los cigarrillos electrónicos pueden afectar a la salud y la salud mental?

The 31 May was World No Tobacco Day, which focuses on prevention of the harmful effects of conventional cigarettes for the health of people directly and indirectly exposed to tobacco smoke. The multiple campaigns on smoking prevention and cessation have achieved a reduction in the use of conventional cigarettes, primarily in the adolescent population, thanks to a greater awareness of the health risks attached to smoking. In recent years the electronic cigarette (e-cigarette) has appeared as a substitute. However, although presented as a safe and apparently effective way to stop smoking, e-cigarettes have become what some refer to as a Trojan horse; by using e-cigarettes, many adolescents are exposed to a higher nicotine intake than with conventional cigarettes.

E-cigarettes were designed by the Chinese pharmacist Hon Lik in early 2000 and were launched on the market in 2003 by a Chinese company, which by 2007 had already registered and patented its design in a large number of countries.¹⁻³ These devices produce aerosol from the heating of liquids containing solvents (vegetable glycerine, propylene glycol or a mixture of the two), one or more flavourings and nicotine,¹ and as such they have been sold as an alternative way to obtain the effect of nicotine without being exposed to the harmful effects of the other components of a conventional cigarette.² This has created a false notion of safety, which has led to acceptance of e-cigarette use and great confidence in using them. From 2011 to 2015 the use of e-cigarettes increased by 900% among adolescents; by 2014 they had become the most used nicotine product in this population.⁴ In 2018, 43% of final-year school pupils in the United States had tried vaping, 20% more

than for conventional cigarettes. The majority of adolescents in middle and high school reported only using flavours with no nicotine. However, on the market, around 99% of the mixtures for e-cigarettes contain considerable amounts of nicotine and usually two to four times more than a conventional cigarette.⁵

Studies in mice have found that the offspring of mice exposed to e-cigarettes have a greater proportion of short-term memory deficit and hyperactivity in adult life. Changes in their DNA, such as methylations and alterations of the chromatin-modifying enzymes, were found to be present in all the developmental stages of the offspring. Widespread DNA methylation and changes in the above enzymes were found in the brain. Other studies have shown that epigenome changes resulting from the use of e-cigarettes are related to clinical conditions such as earlier presentation of Alzheimer's disease.⁶ Yet more studies show that e-cigarettes may be involved in the development of some affective disorders, anxiety, a greater degree of substance abuse and attention disorders, areas which require further investigation.⁴

It is known that there is cerebral immaturity in adolescence, especially in the dopaminergic and GABAergic circuits, which are involved in the reward circuits, and which are affected by exposure to nicotine. Activation of nicotinic acetylcholine receptors in the reward circuit regulates monoamine-dependent neurotransmission, particularly dopaminergic neurotransmission, which is strongly linked to this circuit and to drug reinforcement. Nicotine increases neuronal activity, as measured by mRNA expression, with higher expression in adolescents than in adults in a number

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of reward-related regions, including the nucleus accumbens, the basolateral amygdala and the ventral tegmental area; this activation remains the same in the basolateral amygdala and, with less intensity, in the nucleus accumbens in adult life.⁷ The constant activation of the amygdala leads to greater sensitivity to negative stimuli, which would generate hyper-reactivity and lower tolerance to stressors in adolescents.

Other effects found with nicotine exposure involve the serotonergic receptors, with a decrease in signalling in 5HT1A receptors and less binding of the 5HT2 receptor, which persists in adult life, generating affective symptoms which improve with re-exposure to nicotine or the use of antidepressants.⁸ A similar reinforcing effect has been seen in the effects of cocaine in mice exposed to nicotine during adolescence which persists into adulthood,^{7,8} with this probably being a gateway to the use of that substance.

All these effects are generated by exposure to nicotine, associated with easy access to e-cigarettes, whether purchased directly from shops or online,⁹ along with very little, if any, legal restriction against using the devices. This contrasts with other countries in Latin America¹⁰ and over 60 other countries around the world, which have detected the undesirable effects of e-cigarettes and so prohibited or regulated them. It is therefore time to implement medical, legal and public health strategies to prevent the use of e-cigarettes, especially in the adolescent population due to their greater susceptibility to long-term alterations in brain development, if we are to avoid harmful effects on the mental health of the Colombian population in general. The Asociación Colombiana de Psiquiatría [Colombian Association of Psychiatry] must join forces with other associations and academic centres which for some time now have been publicising the evidence on the serious effects e-cigarette use can have on people, and especially young people, who may be left with an imprint which is difficult to change.

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