

E-CIGARETTES: BOON OR BANE?

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Introduction

The electronic cigarette (or e-cigarette or e-cig) entered the U.S. market less than a decade ago after first appearing in overseas markets [1]. The e-cig is also known as a Personal Vaporizer (PV) or as an Electronic Nicotine Delivery System (ENDS) [2]. The product is spreading in availability and in variety across the United States. As the product gains market share and public attention, the e-cig is being promoted as a safe product for those who seek the pleasure of smoking without the health hazards of smoking conventional cigarettes. Studies to prove this theory have so far shown no consensus; on the contrary, they have given rise to substantial debate. Scientific and psychosocial factors both play significant parts in the debate. It remains for the individual consumer to become well-advised in order to make personal choices in their own best interest. A brief overview of conventional cigarettes might shed some light on e-cigarettes.

The Science of Conventional Cigarettes

The conventional cigarette is a small cylinder of finely cut tobacco leaves rolled in thin paper [3]. The cylinder is ignited at one end and allowed to smolder while the smoke is inhaled from the other end into the smoker's mouth. This smoke contains nicotine which triggers the brain to release dopamine, a chemical linked to feelings of pleasure. The smoker feels a temporary high [4].

However, chemicals in cigarette smoke adversely affect the entire body, causing or worsening many diseases [5, 6]. As soon as the smoke is inhaled, poisonous gases like formaldehyde start to irritate the eyes, nose and throat. Tissues of airways and lungs are damaged. Chemicals like nitrogen oxide can constrict airways, making breathing more difficult. Hydrogen cyanide, carbon monoxide and ammonia weaken the natural mechanisms that clear the lungs and airways of other dangerous chemicals, bacteria and viruses. Radioactive polonium-210 is deposited at the points where the airways split to connect to the lungs. From the lungs, cancer-causing chemicals and other poisons in tobacco smoke are absorbed into the bloodstream and then carried to the rest of the body. Many tobacco poisons such as arsenic and hydrogen cyanide can directly damage the cells that line the heart and its blood vessels. Nicotine and carbon monoxide cause blood vessels to constrict. Smoke also increases blood cholesterol, thereby increasing the chances of developing blood clots. Gases such as carbon monoxide and nitrogen oxide reduce the blood's ability to transport oxygen. The brain and other organs therefore receive less oxygen and consequently have less energy than they otherwise would. Cigarette smoke affects not only the smoker but also those nearby who inhale the smoke second-hand.



Abstract

This article aims to raise public awareness of the scientific implications of electronic cigarettes, also known as e-cigarettes or e-cigs. Although e-cigs may initially appear to be a harmless substitute for the more harmful conventional cigarette, most of the chemicals that are in e-cigs may not be harmless either. In addition, nicotine use of any sort has negative societal implications as well. Although e-cigs may sometimes be a viable stepping-stone to stop using nicotine altogether, people need to be well aware of the pros and cons of e-cigs before getting into what might become a lifelong addiction.

Key Words

Electronic Cigarette, E-Cig, Nicotine, Smoking, PV, Personal Vaporizer, ENDS.

Developmental problems and a predisposition to addiction are especially experienced by babies whose mothers smoked while pregnant with them [7,8].

Ironically, however, the initial release of dopamine creates a false psychological sensation of feeling good. Even though smoking raises the heart rate, the experience may lend a false sense of relaxation if the person smokes while taking a break or while socializing with friends [4]. Social and marketing pressures directly or indirectly affect consumer groups (including youth) who anxiously seek social acceptance and easy ways to cope with the stresses of life [4, 6]. Such pressures combined with attitudes such as curiosity, naïveté and indiscretion make it very easy to try smoking even after being educated about its dangers. Once people try though, they get chemically and psychologically addicted, just as with heroin or with cocaine [4]. Although not every novice smoker finds nicotine pleasant from the first puff, peer pressure usually leads him or her to keep trying until he or she actually is addicted. Not being able to smoke causes miserable withdrawal symptoms. The next cigarette, although compounding the problems, can therefore be misperceived as a solution to this temporary discomfort. A vicious cycle is established [4] which may take decades and tremendous struggle to overcome.

The Science of Electronic Cigarettes

In light of the known dangers and restrictions of conventional cigarettes, the e-cigarette is being marketed as a substitute which releases harmless steam instead of smoke. This is why the e-cigarette is also known as a Personal Vaporizer (PV) or as an Electronic Nicotine Delivery System (ENDS). Instead of using smoldering tobacco in a paper cylinder, the e-cigarette utilizes a heating element that vaporizes a liquid solution [2] which could be simply flavored water or a combination of various chemicals including nicotine [9]. Often looking like a regular cigarette, the e-cig is claimed to provide the social and psychological pleasures of smoking without the hazards and offensiveness of smoke.

However, the safety of the chemicals vaporized in electronic cigarettes has not yet been thoroughly tested in any part of the world. According to a preliminary study performed by the FDA, manufacturers are far from having scientifically proven the safety of e-cigarettes for consumption [10]. They may present an entirely different range of dangers even if chemicals specific to tobacco smoke are absent in some e-cigarettes [9]. When adding nicotine to the mix of chemicals in e-cigarettes the risk they pose to health remains an unresolved puzzle.

Societal implications of Electronic Cigarettes

Are e-cigarettes a safe stepping-stone in the processing of quitting smoking altogether? This also is a topic of much debate. On the one hand, in an isolated study e-cigarettes were found to be at par with nicotine patches for reducing cigarette smoking [11]. On the other hand, according to the 2011-2012 National Youth Tobacco Survey, [7] among children as young as middle-school age in the United States, e-cigarette smoking was on the rise. A significant ($p < 0.05$) increase in the use of e-cigarettes was noticed in the following student groups: 6-12 grades, from 3.3% to 6.8%; Middle (6-9) grades, from 1.4% to 2.7%; High school (10-12) grades, from 4.7% to 10.0%. An estimated 1.7 million students used e-cigarettes, although 160,000 of these students had “never used conventional cigarettes.” This study suggests that although e-cigarettes have the potential to assist with smoking cessation, they are a growing addiction among children who have never even smoked conventional cigarettes.

Though laws and regulations for the manufacture, quality and sale of e-cigarettes are being put in place they vary widely by country and by state, and are themselves still much in debate [6, 10]. In addition, smoking and tobacco use have long been known to cause or worsen life-threatening diseases. Healthcare needs and

expenses of tobacco users skyrocket exponentially as compared to those of non-users. Efforts to educate society and to reduce the use of tobacco have put significant restraint on the availability of cigarettes (especially in the U.S.) and on the acceptability of their use in public spaces.

Summary

In summary, e-cigarettes may be both a boon and a bane, depending on the type of e-cigarette and on the context in which it is used. Some people may benefit from the use of e-cigarettes; others may not need them. Others still may be harmed. Successful cessation of nicotine use will rehabilitate the consumer's body from addiction and also the psyche from yielding to social and media pressures. All in all, a shrewd populace should recognize that the solution to one of society's largest health hazards is multifaceted and cannot be cured simply by the use or disuse of specific products.

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