Short Communication

Electronic Cigarettes: Facts and Myths

Anjali Solanki[1], Kartikeya Kashyap[2] and Surender Kashyap[1]

Kalpana Chawla Government Medical College[1], Karnal and Government Medical College and Hospital[2], Chandigarh, India

Abstract

E-cigarettes are devices designed to deliver nicotine to users without burning tobacco. These are being marketed globally as a healthier substitute to the conventional cigarettes and as smoking quitting aids. The use of these devices has increased recently in developed countries with approximately 1.3 million users reported in the United Kingdom in 2013. Perception of these products as a safe alternative, appealing advertisements, and lax regulatory policies have helped gain popularity among the public. Despite all these claims, a debate is on-going because of insufficient scientific data regarding safety and efficacy of e-cigarettes as well as awareness of the potential health hazards. To solve the dilemma, more scientific studies in this field are required. Prompt regulatory response with strict vigilance on marketing and advertising may be desirable in the interest of users and public at large. **[Indian J Chest Dis Allied Sci 2012;56:263-265]**

Key words: Electronic cigarettes, Marketing, Tobacco, Cytotoxicity.

Introduction

Electronic cigarettes (ECs) or electronic nicotine delivery systems (ENDS) are rapidly attaining popularity because of claims of efficacy in quitting smoking. But, it simultaneously raises issues regarding potential health hazards and unregulated marketing of these products.

For definition purpose, these are the devices whose function is to vapourise and deliver to the lungs of the user a chemical mixture typically composed of nicotine, propylene glycol and other chemicals, some of which are considered toxicants. Electronic cigarettes are the most common prototype of ENDS. Each device contains an electronic vapourisation system, re-chargeable batteries, electronic controls and cartridges of the liquid that is vapourised. These devices are shaped to give the appearance of their conventional (tobacco) counterparts or everyday items like pens and USB memory sticks to avoid noticing by others.[1]

The original EC consisted of a cartridge with nicotine-containing fluid and an atomiser which aerosolised the cartridge fluid when heated by a battery.[2] Now-a-days, the cartridge and atomiser are combined into a single unit, termed a "cartomizer".[3] The ENDS initially emerged in China in 2003 and have since become widely available and readily accessible particularly over internet.

Increasing Awareness and Rapid Adoption

E-cigarettes are gaining rapid popularity in developed countries. According to a well-designed four-country (United States, United Kingdom, Canada and Australia) survey conducted by Adkison and colleagues,[4] 46.6% of the participants were aware of ENDS (US 73%, UK 54%, Canada 40%, and Australia 20%); 7.6% had tried ENDS; and 2.9% were current users. Another review by the UK Medicines and Healthcare Products Regulatory Agency found that a tenth of the UK smokers now use ECs; the number of UK users has risen to around 1.3 million in 2013, up from 700,000 in the previous year.[5] Prevalence of trying ENDS is reported to be higher among younger, non-daily smokers with a high income and among those who perceived ENDS as less harmful than traditional cigarettes.[4] In the United States, though awareness is more prevalent among men, experimentation with ECs is more common among women. The appealing design and packaging of ECs along with perception of being a clean nicotine device might have contributed to this gender difference.[6]

Moreover, the results of epidemiological, population-based studies hint towards dual use of ECs and conventional tobacco cigarettes suggesting influence of marketing messages. The most common reasons attributed to trying ECs are its use in the smoking prohibited places, to cut down on smoking, and the role in quitting smoking.[7,8]

Another major concern is increasing awareness and experimentation of ECs among younger population. Although limited data show rapid increase in awareness and use by youth in five countries (United States, Poland, Latvia, Finland, and Korea)[9-11] (GYTS Data Latvia and Finland.[9-12] In Korea, among youth ever use of ECs rose from 0.5% in 2008 to 9.4% in 2011, and in the United States, it rose from 3.3% in 2011 to 6.8% in 2012.[9,10] Similar to adult population, dual use with conventional cigarettes is the predominant pattern of ECs use — 61% among the US middle school students

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Correspondence and reprint requests: Dr Surender Kashyap, Director, Kalpana Chawla Government Medical College, Karnal-132 001 (Haryana), India; E-mail: surenderkashyap@hotmail.com

and 80% among the US high school students in 2011.[9] Risk of nicotine addiction and probability of initiation of other tobacco products in the future cannot be denied in this group.

Risk Remains Indeterminate

Due to lack of sufficient scientific research, potential risk associated with these products remains undetermined. Furthermore, the products vary widely in the amount of nicotine and other chemicals, and thus, the consumer remains unaware about the actual contents of the product they have purchased.[5]

Though ECs contain fewer chemicals as compared to conventional cigarettes, absolute safety has not been established. Propylene glycol and glycerine are the basic ingredients of the e-liquid. Exposure to propylene glycol can cause eye and respiratory irritation, and prolonged or repeated inhalation in the industrial settings may affect the central nervous system, behaviour, and the spleen.[13]

Testing by the US Food and Drug Administration (US-FDA) on some ECs demonstrated the presence of diethylene glycol, which can lead to mass poisonings and deaths when inadvertently substituted for propylene glycol in consumer products. The additional presence of irritants, solvents, genotoxins and animal carcinogens (e.g., butyl acetate, diethyl carbonate, benzoic acid, quinoline, dioctylphthalate 2,6-dimethyl phenol) are of uncertain significance and further consideration is required.[14] Moreover, addition of flavouring agents to attract consumers may also adversely affect the health of users due to cytotoxic effect of cinnamon flavourings in refill fluids as demonstrated by in *vitro studies*.[15] In another study by Bahl *et al*[16] using three cell types (human pulmonary fibroblasts, human embryonic stem cells, and mouse neural stem cells), cytotoxic effect of refil fluid varied among products from highly toxic to minimum or no cytotoxicity. Higher sensitivity of stem cells to cytotoxicity as compared to differentiated adult pulmonary fibroblasts cells raise apprehensions regarding safety in pregnant women who are either the users or exposed to the second-hand EC aerosol.

Contrary to marketing claims which advertise EC aerosol as 'water vapour', particulate nature has been established by various studies and the particle size distribution and number of particles delivered by ECs are similar to those of conventional cigarettes, with most particles in the ultrafine range which are small enough to reach deep into the lungs and cross into the systemic circulation.[17,18] Even though ECs do not burn and emit smoke like the conventional cigarettes; second-hand exposure occurs through aerosol exhaled by the user.[12]

Promotion and Marketing

In this new era of marketing, ECs are primarily advertised through print, television and internet with youth being the target group.[19] Various forms of promotion include television commercials, sports and cultural sponsorship, celebrity endorsement, social networking, online advertising, point of sale displays, pricing strategies, and product innovation with alleged safety and its role in cessation being the main theme of marketing.

These products have gained significant popularity over social media and are advertised as socially attractive trend for young people. Even the stakeholder groups, such as regulators, politicians and public health experts are also being influenced by companies which are promoting ECs as much safer and healthier alternative.[20] In a review of EC retail websites in 2012, Grana and Ling[21] found that the most popular claims were that the products are healthier (95%), cheaper (93%), and cleaner (95%) than the conventional cigarettes; can be smoked anywhere (88%); can be used to circumvent smoke-free policies (71%); do not produce second-hand smoke (76%); and are modern (73%).

The market for ECs is further expanding with active involvement of tobacco industries. By 2013, the major tobacco companies had purchased or developed EC products for dual benefit through expanding their cigarette line while touting their ability to offer a product they claim reduces harm from the cigarettes.[12]

Reality of Claims as Cessation Aid

Electronic cigarettes are primarily used as smoking cessation aid or an alternative to smoking but efficacy of ECs as a quitting aid has not yet been firmly established. Though, some smokers cut-down smoking while using ECs, the total nicotine consumption seems to remain unchanged. Electronic cigarettes seem to have the similar (weak) efficacy as cessation aid as nicotine patches.[22] Moreover, a considerable portion of ex-smokers that stopped with the aid of ECs continue using them, thus, sustaining nicotine dependence.[23]

In a four-country survey conducted from July 2010 to June 2011 in the United States, United Kingdom, Canada and Australia, nearly three quarters (70.4%) of the sample reported that they used ENDS as a way to obtain nicotine in smoke-free spaces, indicating that ENDS were being used also to satisfy nicotine addiction during periods of temporary or forced abstinence.[4]

Monitoring

Monitoring of these products also differs among various countries. For example, these are to be regulated as medicines in the United Kingdom from 2016, to ensure their quality and safety, but some countries have introduced restrictions on the sale and use of ECs. Countries such as Brazil, Norway and Singapore have already banned them completely.[24] In the United States, ECs that are marketed for therapeutic purposes are currently regulated by the US-FDA Center for Drug Evaluation and Research (CDER).

Recommendations and Patient Information

Considering the impact of ECs on public health, regulation of the manufacture, marketing and sale of ECs is mandatory to ensure consumer safety; either to regulate these as medicines or maintaining a comprehensive ban on all the advertising, promotion and sponsorship till sufficient scientific evidence is available regarding their safety and efficiency as a cessation aid. Prohibiting sale of attractively flavoured ECs and to minors could prevent nicotine addiction in younger generation. Moreover, packaging and labelling of EC cartridges and disposable of ECs should include a list of all ingredients, stipulate the quantity of nicotine and include appropriate warning labels.[25]

Fascinated by advertising and marketing, if a user chooses ECs as a quitting aid, the concerned physician or counsellor should provide information about unregulated production, toxic constituents and possible health hazards. The user should also be advised not to use the product indoors or around children to avoid passive exposure of nicotine and other toxins through the EC aerosol.[18]

Indian Perspective

For Indian population, no data is available regarding its awareness and use. However, various products are easily available online with similar marketing claims.

Conclusions

Amid the arguments and controversy about ECs, with some claiming and considering these devices as potential smoking cessation aid, while others insisting for its ban due to lack of safety and the efficacy data, detailed scientific analysis of benefits and risks is essential before any firm recommendations are made. Till then, strict monitoring on the marketing and advertisement of these devices along with warning the consumers against doubtful safety of these products is advisable.

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