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E Cigarettes- Trends and Health Effects : A Review

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ABSTRACT

Electronic cigarettes also known as e-cigarettes are products that provide a nicotine-containing aerosol to users by heating a solution which is mainly made up of nicotine or flavoring agent. With rapid increase in use and popularity of e-cigarettes usage the health related adverse effects are not known to many. Evidence suggests that compared to conventional cigarettes, e-cigarettes have less adverse effects. Contrary, there were many clinical studies reporting various health effects of nicotine and tobacco products .Most of the results were based on short term outcomes , long term studies should be done regarding the usage and health effects of e-cigarettes. This review tends to review the trend and health effects of e-cigarettes based on existing literature articles.

KEY WORDS: E-CIGARETTES; HEALTH EFFECTS; TRENDS; SMOKING.

INTRODUCTION

Tobacco use in India is mainly of two forms, smoking (cigarettes ,Bidis) and smokeless forms (gutka, pan masala, Areca nuts). Tobacco has been estimated to cause premature death worldwide. (India. Ministry of Health and Family Welfare, 2007). Tobacco consists of various toxic and carcinogenic chemicals present in it, one of the main components is nicotine. Tobacco has been compulsively used nearly every culture into which tobacco has been introduced. According to WHO, in India 94 million men and 45 million women used tobacco in smoke or smokeless form (Bulletin of the World Health Organization, n.d.).

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Electronic nicotine delivery systems (ENDS) are battery powered devices that provide doses of nicotine and other additives to the user in a hand held device in a vapour form also known as vape pens, e-cigars, or vaping devices . There are multiple types of ENDS including electronic cigarettes, or e-cigarettes, as well as e-hookahs, e-cigars, and e-pipes. Some of these products are disposable varieties, while others can be refilled or recharged for repeated use (Benowitz, 2011).

E-cigarettes use a metal resistance coil to heat and aerosolized mixtures such as tobacco-specific nitrosamines, aldehydes, metals, volatile organic compounds, phenolic compounds, polycyclic aromatic hydrocarbons, and tobacco alkaloids are components of e-cigarettes but at lesser concentration than conventional cigarettes (Cheng, 2014). Some studies have reported that e-cigarettes can be used as smoking cessation therapy due to lesser concentration of tobacco components (Brown et al., 2014) while other studies debate on potential harm and ill effects of tobacco (Gornall, 2015). E-cigarettes were originally marketed in 2004, known as cig-a-likes developed by China as a less dangerous alternative to conventional cigarettes (Grana et al., 2014).

Most electronic cigarettes release nicotine and other potentially toxic and irritating substances into the air thereby affecting the by -standers (Daynard, 2018). There is highest relative risk for cancer initiation due to smoking is the lungs and oral cavity .Two potential hazards related to e-cigarettes are acute toxic effects caused by accidental or intentional ingestion of e-cigarette liquids causing nausea, vomiting, headache, dizziness and physical injury caused by the e-cigarette device such as explosion of the device (Vakkalanka et al., 2014). Unlike cigarettes, scientific knowledge about alternative tobacco forms such as e-cigarettes , smokeless tobacco remains limited, and in most cases there is a lack of regulation. This review aims to update the trends and effects of e-cigarettes on health.

Trends on E-Cigarettes: E-cigarette have been an initiation for smoking habits among young adults who were non-smokes earliest (McMillen et al., 2014). A cohort study shows , 81% of youth users of electronic cigarettes reported that their starter product was flavoured compared with 61% and 46% of young and adults, respectively (Villanti et al., 2017). Studies have shown that there is increased use of e-cigarettes among U.S.population (Arrazola et al., 2015) US National Youth Tobacco Survey, over 1.6 million high school students and 500000 middle school students used electronic cigarettes in 2015 (Singh, Arrazola, et al., 2016)In the United Kingdom, adult e-cigarette use has more than tripled from 700,000 users in 2012 to 2.6 million users in 2015 (Ash, 2016). The 2015 GATS-2 estimated that the prevalence of use of e cigarettes in india was 0.02% (268,000 users) (Asma et al., n.d.). Electronic cigarette advertisements on internet sites, retail stores, movies and other media are associated with growing use among students (Singh, Agaku, et al., 2016).

Modular systems (mods), containing batteries, fillable liquid tanks, and heating coils have a comparably small allowing the use of custom-made flavors and individualized settings for temperature and wattages. (Pearson et al., 2020). Advances in technology, Juul device was introduced which resembles a USB memory stick with cartridges (pods) that are exchangeable by the user and filled with flavored e-liquids (King et al., 2018). In order to deliver nicotine to the lungs, the user inhales through a mouthpiece, and the airflow triggers a sensor that then switches on the atomizer (Eisenberg et al., 2018).

Adverse Health Effects

Oral cavity: A case report shows occurrence of lichenoid reaction in oral mucosa after using e-cigarette (Reuther et al., 2016). Exclusive tobacco consumption appears to be more likely to contribute to epithelial dysplasia in precancerous condition such as leukoplakia, erythroplakia is a hallmark for cancer development (Institute of Medicine et al., 2001). Smokers have been found to have increased number of neutrophils but decreased activity which elevates the oxidative burst thus causing tissue destruction by direct toxic effect from tobacco (Shirodaria et al., 2000); thus smoking exerts a strong untoward effect on periodontal health and is a major risk factor for periodontal disease (Okamoto et al., 2006). Smokers exhibit decreased bleeding upon probing, increased clinical loss of attachment, gingival recession and tooth mobility independent of age, gender and systemic condition (Machuca et al., 2000). Smokers respond less favourably than non-smokers to nonsurgical ,surgical periodontal therapy and they have poor wound healing capacity (Preber et al., 1995).Tobacco use may directly compromise the osseointegration of root-form dental implants causing peri-implantitis and implant failure (Wallace, 2000). Long-term smoking would significantly reduce salivary flow rate and increase oral and dental disorders associated with dry mouth, especially cervical caries, gingivitis, calculus and halitosis (Rad et al., 2010). Menthol and tobacco e-liquids present in e cigarettes may alter the enamel color altering the dental aesthetics (Pintado-Palomino et al., 2019).

Respiratory system: A clinical study reported e-cigarette use is reportedly less harmful than conventional smoking and can lead to reduced cigarette consumption with subsequent improvements in status of asthma outcomes, e-cigarette can be a valid option for asthmatic patients who cannot quit smoking by conventional method (Polosa et al., 2014). Oxidants or reactive oxygen species found in cigarette smoke generated from tars are major contributors in mediating an inflammatory state, which have been implicated in the pathogenesis of diseases, such as chronic obstructive pulmonary disease (COPD) and lung cancer (Sundar et al., 2013) .Reports on parenchymal and bronchial inflammation, lung damage and toxicity (e.g., lipoid pneumonia, hypersensitivity pneumonitis as well as impaired systemic inflammation signaling, and defense mechanisms associated with e-cigarette exposure (Reidel et al., 2018; Staudt et al., 2018). In patients with COPD, the use of e-cigarettes has been associated with more cough and phlegm, more exacerbations and possibly a more rapid decline in lung function (Bowler et al., 2017).

Cardiovascular system: Cardiovascular disease is the major cause of death among smokers (Askin et al., 2017) e-cigarette use acutely and negatively (increased) impacted vital signs, such as heart rate and blood pressure (Yan et al., 2015). E-cigarette has been associated with paroxysmal atrial fibrillation (PAF) and acute myocardial infarction in cardiovascular system (Monroy et al., 2012) e-cigarette vapor extracts were found to enhance activation (aggregation and adhesion) of platelets which is important step in progression of atherosclerosis (Hom et al., 2016). Cigarette smoking can cause coronary spasm and is a risk factor for vasospastic angina. (U. s. Department of Health and Human Services Staff, 2010). However some studies show that Electronic cigarettes deliver nicotine without combustion of tobacco and appear to pose low cardiovascular risk in short term usage (Benowitz and Burbank, 2016). E-cigarette use did not have any effect on complete blood count (Flouris et al., 2012).

Central Nervous System: E-cigarettes may also directly damage neurons and cause tremor and muscle spasms (Grana et al., 2014). As for the central nervous system, e-cigarettes may alter brain functions, which affects the mood, learning abilities, memory, and could even induce drug dependence in both humans and animals (Yuan et al., 2015). At low doses, nicotine is a weak analgesic, but at high doses, it causes tremors and seizures (Schraufnagel, 2015).

Gastrointestinal Tract: Nicotine causes peptic ulcer and gastrointestinal cancers (Chu et al., 2013). Chronic exposure of cigarette smoke induces systemic hypoxia leading to intestinal dysfunction causing Crohn's disease(Fricker et al., 2018).

Reproductive system: Exposure to nicotine in utero causes decreased birth weight, prematurity, neonatal morbidity, and mortality, including sudden infant death syndrome (Cliver et al., 1995) .Nicotine is associated with erectile dysfunction and decreased sexual arousal. (Harte and Meston, 2008). E-cigarettes have been found to have less harmful alternatives than tobacco cigarettes and are perceived as safe to use during pregnancy by pregnant women (Kahr et al., 2015).

E-Cigarettes Ban in India: The long-term health effects of e-cigarettes have not yet been documented in humans; however, the short-term negative effects causing deleterious effects on multiple biological systems have been suggested by several studies.The most powerful tools to reduce tobacco use have been increased taxes, bans on smoking in public places, and denormalizing its use. Tobacco and nicotine always possess various health related risk.In India, a proposal to ban electronic cigarettes has gained momentum and a bill has been passed to stop production, trade and transport e-cigarettes by the Union Government of India in September 2019 (Balaji, 2019).

CONCLUSION

E-cigarettes have been associated with biological effects and many health related effects in consumers . Although few studies claim it can be used as an alternative to conventional smoking, there are many studies which contradict by showing various adverse health effects. Strict rules and regulations should be enforced on usage of e-cigarettes

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