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A Review on E-Cigarettes Ban in India

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ABSTRACT: Electronic cigarettes are battery powered devices that people use to heat liquid into a vapour that can be inhaled[1]. Vaping is the process of inhaling the vapour created by an electronic cigarette(e-cigarette)[8].These novel products come with attractive appearances and multiple flavours and their use has increased exponentially and has acquired epidemic proportions in developed countries, especially among youth and children[2]. And the inhaled vapour may contain nicotine, flavourings , and toxins-including ones that cause cancer. The government controls e-cigarettes as tobacco products. Youth who use nicotine are at risk of long-term health effects. Nicotine affects the development of the brain's reward system and brain circuits that control attention and learning. Continued use of nicotine can lead to addiction and raise the risk for addiction to other drugs[1]. Researchers have suggested that e-cigarettes may help smokers reduce their use of traditional cigarettes[3] and may have a valuable role in smoking cessation for adults[4]. Such a replacement will affect the smoker's health in a positive way[5]. Despite having major drawback's with e-cigarettes such as addiction, lung problems etc. The Indian government has told a court that its federal ban on the sale of electronic cigarettes implies that their use is also prohibited. Although Advocates for e-cigarettes say vaping is far less harmful than smoking tobacco, India banned the sale of e-cigarettes as it fears they could lead to increased nicotine addiction[6]. On 18 September 2019 India banned all e-cigarettes over fears about youth vaping[7].

Keywords: e-cigarette, vaping, epidemic.

I. E-CIGARETTES:

A device that has the shape of a cigarette, cigar, or pen and does not contain tobacco. It uses a battery and contains a solution of nicotine, flavourings, and other chemicals, some of which may be harmful. When electronic cigarettes are used, the nicotine solution turns into mist that can be inhaled into the lungs. The amount of nicotine in individual e-cigarettes can vary[9].

e-cigarettes, also known as vaping devices , e-vaporizers, or electronic nicotine delivery systems. They can resemble traditional tobacco cigarettes, cigars, or pipes, or even everyday items like pens or USB memory sticks. Some common names for e-cigarettes are:
e-cigs
e-hookahs
hookah pens
vapes
vape pens
mods(customizable, more powerful vaporizers)
-Cigalikes look similar to tobacco cigarettes and can be disposable or rechargeable.
-Vape pens are shaped like a pen or small tube, with a tank to store e-liquid, replaceable coils and rechargeable batteries.

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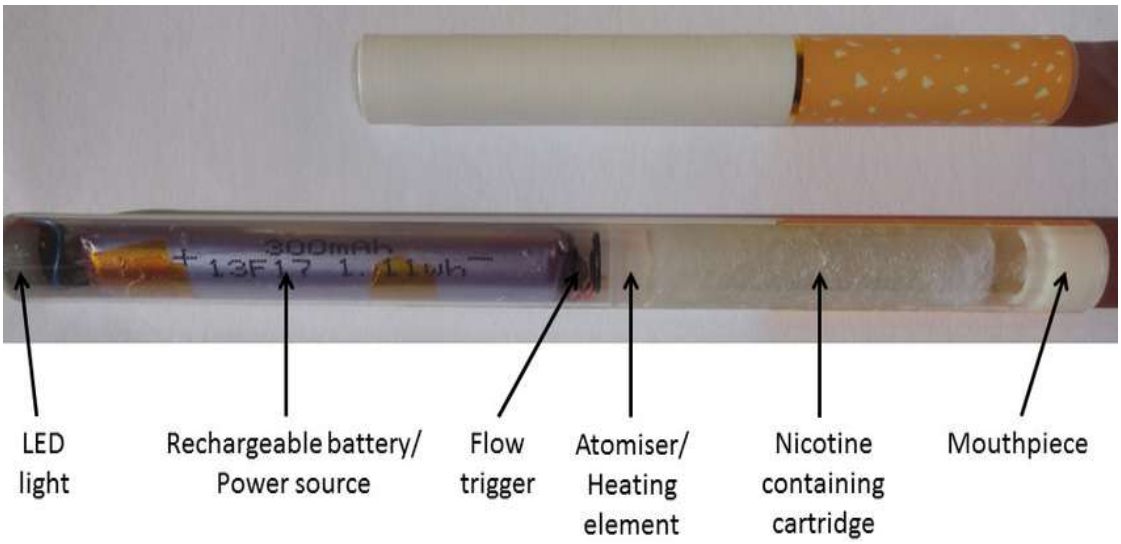
-Pod systems are compact rechargeable devices, often shaped like a USB stick or a pebble, with e-liquid capsules.
-Mods come in different shapes and sizes, but are generally the largest e-cigarette devices. They have a refillable tank, longer lasting rechargeable batteries, and variable power[15].

A rechargeable e-cigarette with a refillable tank delivers nicotine more effectively and quickly than a disposable model and is likely to give you a better chance of quitting smoking.
In many e-cigarettes, puffing activates the battery-powered heating device, which vaporizes the liquid in the cartridge. The person then inhales the resulting aerosol or vapour is called vaping[11].

EVOLUTION OF E-CIGARETTES:

The first electronic cigarette device was patented in the year 1930s. The first functioning prototypes were created in the 1960s, but their commercialisation failed. In the early 1980s, Phil Ray, a computer pioneer , along with his physician, Norman Jacobson, revisited and designed a more realistic functioning device, but this had a limited commercial impact. These first devices, merely relying on nicotine evaporation, were perceived as ineffective by conventional tobacco users. After a series of other, mostly unsuccessful, attempts at the dawn of the new millennium, the current version of the electronic cigarette was created in Beijing, China, in the early 2000s, by a smoker pharmacist who rediscovered the device after his father died of smoke-related lung cancer. After being patented in 2004, electronic cigarettes had a strong and steady increase in popularity worldwide. They launched in Europe in 2006, and then in the US. Subsequently, intense and controversial intellectual and legal battles began among supporters and opponents of this emerging smoking lifestyle[27].

COMPONENTS OF E-CIGARETTES:



E-cigs are most often composed of several parts, including:
a mouthpiece
a cartridge or tank
e-liquid (aka 'juice')
a heating element, atomizer, or cartomizer
a microprocessor
battery(sometimes more than one battery is required)
a charger
an LED light in various colors(sometimes)[14]

Above figure illustrates the components of a standard e-cigarette. When the user inhales, airflow is created which activates the flow trigger. The LED light turns on and the heating element vaporizes the solution in the cartridge (which contains propylene glycol, nicotine and sometimes flavourings) into mist. The nicotine containing mist is then inhaled by the user through mouthpiece. Refill solutions in nicotine cartridges have been shown to contain low levels of several toxic substances. These substances include carbonyl compounds, volatile organic compounds, nitrosamines, ultrafine particulate matter and heavy metals.

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ADVANTAGES OF E-CIGARETTES:

It is very easy to use.

It is used by people wanting to quit traditional smoking.

Vaping is considered to be healthier compare to normal tobacco smoking.

Smokers of e-cigarettes do not get cough and phlegm. They will have better physical stamina and cardio compare to traditional smoking. They will not get any wheezing problems in the chest.

E-cigarettes can be used anytime and almost anywhere unlike traditional cigarettes.

They are available in many flavours as mentioned and will be used by smokers as per mood. Hence it satisfies needs of the consumers.

E-cigarettes contain no tobacco, no tar.

It does not harm people present around unlike cigarette smoking which harm non-smokers present in the vicinity[16].

E-cigarettes have: The capacity to raise the blood level of nicotine quickly (by at least 10ng/ml in 10 minutes). Allowed users to regulate their nicotine blood concentration.

Switching from cigarettes to e-cigarettes reduced the craving to some and affected brain regions associated with addiction. Exposure to nicotine was also significantly reduced as well as tobacco specific nitrosamines, cigarette biomarkers of toxicity demonstrating prominent harm reduction following switching to e-cigarettes. And several other findings support electronic cigarettes as an effective way of stopping smoking, quickly inducing beneficial changes in various measures of psychometric health and the craving to smoke.

Some research studies have revealed that, during pregnancy e-cigarettes are likely to be much less harmful to a pregnant woman and her baby than cigarettes.

DISADVANTAGES OF E-CIGARETTES:

Besides advantages there are many disadvantages of e-cigarettes and vaping as follows,

-E-cigarettes can be filled with e-liquid containing nicotine. Often it can be used with other drugs which can lead to harmful effects for the human body and society.

-It has shorter battery life.

-It is heavier than cigarettes.

-Some flavours linger in the air while disposing cartridges and batteries.

-Second hand mist contains nicotine.

-It is reinforcing/ addictive[16].

Potential health risks:

Exposure to the same toxins as cigarettes but in higher quantities. E-cigarette smoke contains high levels of many toxic compounds found in cigarettes. These include carbon monoxide, heavy metals, chemicals linked to cancer. Cancers associated with the toxins and chemicals are: Lung cancer, Stomach cancer, Esophageal cancer.

Other conditions associated with the toxins and chemicals include: Heart disease, Respiratory diseases like emphysema, COPD, Asthma which causes difficulty in breathing.

Potential to spread infectious diseases. Sharing a e-cigarette with other people increases the risk of transferring diseases and viruses. Especially if people do not clean the mouthpieces properly.

Nicotine addiction. The tobacco in e-cigarettes and traditional cigarettes contains similar levels of nicotine. And nicotine is highly addictive[17].

Prolonged use of smokeless tobacco products contributes to serious health issues. These include cancer and heart diseases.

Some smokeless tobacco products 3-4 times more nicotine than cigarettes. And these products contain substances that increase risk of oral and oropharyngeal cancer.

Many people claim that these products are less harmful than smoking and can help people stop smoking. But these alternatives are not evidence based methods. The FDA has not approved smokeless tobacco products for quitting smoking[18].

ROLE OF E-CIGARETTES IN SMOKING CESSATION:

Tobacco use continues to be a major cause of morbidity and mortality. Even with behavioural and pharmacological treatment, long-term tobacco cessation rates are low. Electronic nicotine delivery systems, commonly referred to as electronic cigarettes, are increasingly used for tobacco cessation. Small, short-term studies assessing smokers' use of e-cigarettes suggest that e-cigarettes may be well tolerated and modestly effective in achieving abstinence. High-quality studies are lacking to support e-cigarette use for cessation in patients with mental health issues. One small prospective cohort study concluded that patients with mental health issues reduced cigarette use with e-cigarette use. Although, one study found that patients with cancer reported using e-cigarettes as a tobacco-cessation strategy, e-cigarettes were not effective in supporting adstinence 6 and 12 months later. Although, study subjects report minimal adverse effects with e-cigarettes and the

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incidence of adverse effects decreases over time, long-term safety data are lacking. Health care providers should assess e-cigarette use in their patients as part of the tobacco cessation processis one of the main methods in the management of many diseases for example COPD and is an obligatory part of its treatment. Therefore, the search for the new methods for the smoking cessation continues. Electronic cigarette is one of them. According to the survey conducted among former smokers they evaluated that e-cigarettes are low-effective as an independent component of smoking cessation program and it is not recommended that e-cigarettes as an independent method for the smoking cessation, because they have low clinical efficacy and high economic expenses[19].

The popularity of electronic(e)-cigarettes has exploded with a commensurate increase in the variety of e-cigarette products available. Many smokers have turned to e-cigarettes as a perceived safer alternative to smoking despite little evidence to verify either the efficacy or long-term safety of these drug delivery devices. Several trials and a large meta analysis have been performed in recent years with mixed results. A study published in 2016 reviewed 38 large studies and concluded that e-cigarette use was associated with a 28% decrease in likelihood of smoking cessation. The most recent survey in the U.K. found a rise in vaping from 700,000 in 2012 to 2.9 million in 2017, and the primary reason ex-smokers(52% of vapers) give for using e-cigarettes is to help them stop smoking, while current smokers (45% of vapers) use e-cigarettes principally to decrease their cigarette smoke intake. Additionally, no studies exist as to the effects of e-cigarette usage with conventional smoking cessation aids, either NRT or pharmacotherapy. E-cigarettes are rapidly evolving, the newer generation devices having improved nicotine delivery, thus newer studies on more modern devices may find that these drug delivery devices have efficacy in the arena of smoking cessation[20].

The role e-cigarette play on tobacco dependence, the morbidity and potentially mortality from tobacco is "unclear". A recent randomized trial that put electronic cigarettes directly into the hands of the smoking population and found 18% put the traditional cigarette down vs. 10% who were exposed to the patch.

The use of electronic cigarettes greatly improved the likelihood of smoking abstinence in study participants after 1 month, but the effect diminished at later follow-ups[21].

The high prevalence of e-cigarette use may be attributed to many factors, including the perception that e-cigarettes are safer than combustible cigarettes and that use of e-cigarettes can help smokers quit combustible cigarettes. Indeed e-cigarettes have been promoted as reduced-harm products, and it has been argued that their continued availability may lessen the burden of disease and disability associated with smoking combustible cigarettes. In consideration of the potential residual harm imposed by e-cigarettes, their inability to promote complete nicotine abstinence, and their modest efficacy compared with other currently available pharmacological options, little evidence appears to support their role in tobacco or nicotine cessation[22].

Data on the impact of e-cigarettes on smoking cessation is very limited. Again, there are contradictory sources but few of these are studies of the form that would give us any comfort. One study by Hajek produced in January 2019 looked at 886 NHS stop smoking services users and randomly allocated them to two groups – one given traditional [Nicotine Replacement Therapy(NRT)] such as patches and one given e-cigarettes. After one year of follow up, the proportion of those who were assigned e-cigarette who were still non-smokers was 18% compared to 9.9% of those assigned other NRT products. This implies that e-cigarette has major role in nicotine cessation[23].

Pathways through smoking cessation and initiating vaping:

Below figure provides a summary of the total sample encapsulating reported pathways through initiating e-cigarette use and quitting tobacco smoking.

Most of the sample reported long histories of tobacco smoking and multiple previous quit attempts However, a minority (seven people) had never seriously attempted to quit smoking. These people stated that they enjoyed smoking and had no particular desire to quit.

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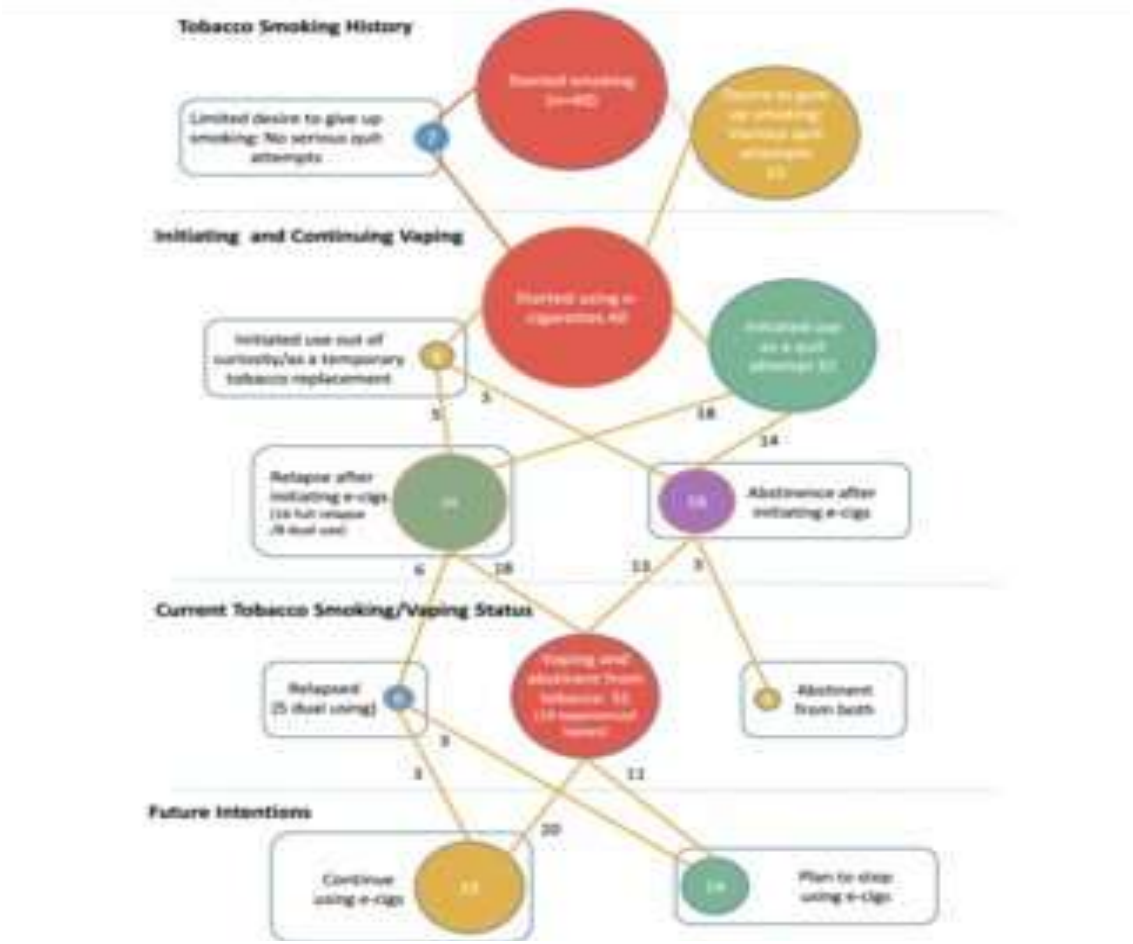
PATHWAYS THROUGH SMOKING CESSATION AND INITIATING VAPING:



The role of smoking is important because interpretations of whether e-cigarettes are good or bad can depend on who is using them, and who they are being compared to. While the long-term health effects of vaping are not yet known and vaping may be associated with some harm, these harms are thought to be relatively small compared to the strong harms that we know to be associated with smoking. This means, for example, that while vaping among those who have never smoked might be a concern, vaping among smokers and ex-smokers is more desirable because it can involve people switching away from smoking[24].

The findings of inequalities in vaping among young people who had never smoked could therefore indicate some potential for widening of health inequalities, in that there may be some harm associated with vaping.

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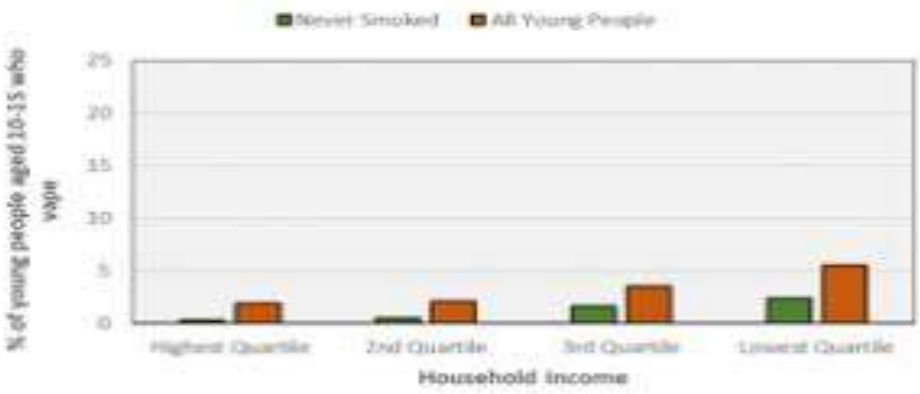
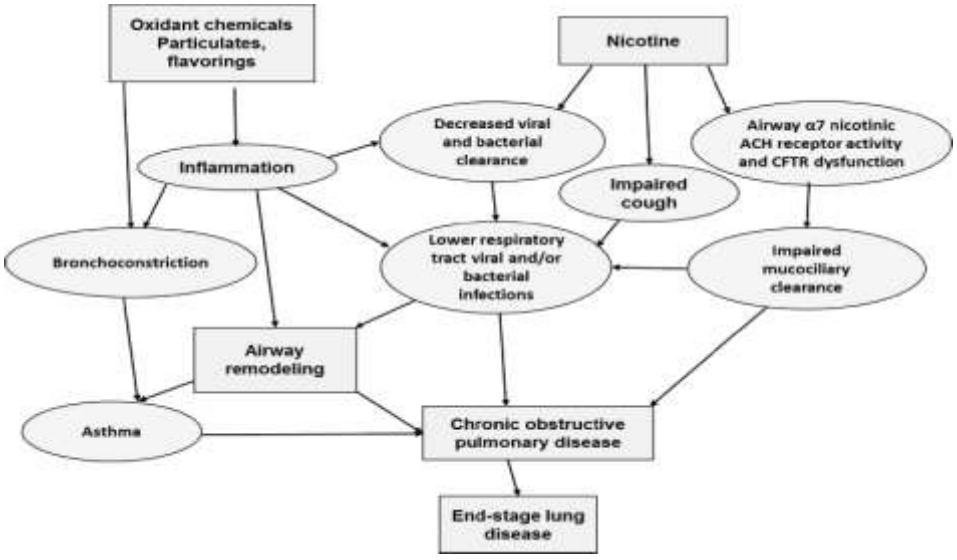


Future research with vaping and smoking measured at intervals will help clarify these issues and help us understand the overall population impact of these different processes, but these initial findings suggesting that vaping may weaken inequalities in smoking cessation, while remaining rare among youth, are encouraging[25].

E-CIGARETTES AND RESPIRATORY DISEASES:

Smoking of combustible tobacco products is the major cause of chronic obstructive pulmonary disease(COPD) worldwide. Currently there is a lack of information regarding the short- and long-term effects of e-cigarettes on the respiratory system. Nevertheless, exposure of the lungs to various components of the e-cigarette aerosol could potentially damage the respiratory system or worsen pre-existing lung disease through a variety of mechanisms.



For example, nicotine-containing e-cigarette aerosols have the potential to adversely impact several host defense mechanisms in the lungs. In murine model, α7 nicotinic acetylcholine receptors(α7 nAChRs) were shown to regulate cystic fibrosis transmembrane conductance regulator (CFTR) activity in the airways. Exposure to nicotine downregulated α7 nAChR activity, which in turn impaired CFTR function, causing impaired mucociliary clearance (MCC). In humans, CFTR dysfunction has been shown to be associated with the development of COPD and Asthma hyperresponsiveness. Exposure to nicotine in tobacco smoke and e-cigarette aerosols also has been reported to impair cough. Furthermore, nicotine has been shown to downregulate Th1 immune responses to lipopolysaccharide, consistent with an immunomodulatory effect of nicotine on viral and bacterial clearance.

Independent of nicotine, exposure to particulates and flavourings in e-cigarette aerosols could also potentially impair lung function. The

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presence of ultrafine particles has been measured in the aerosols of e-cigarettes and particulates in the submicron range have the potential to damage airways and lung parenchyma. The health risks from exposure to particles will depend on their nature, not simply on their size. Nevertheless, certain ultrafine particles, which encompass particle sizes less than 100nm, can cause DNA damage, induce pro-inflammatory cytokine expression, and adversely affect the immune system through the production of free oxygen radicals. In addition, inhalation of ultrafine particles has been reported to increase the rate of asthma exacerbations. Flavorings in e-cigarettes may also alter cellular redox balances in the airways by increasing pro-inflammatory cytokines, and high temperatures generated by e-cigarette devices may cause formation of formaldehyde, leading to toxic effects on the lungs.

In established smokers who are trying to quit or reduce combustible tobacco use, e-cigarettes may be less deleterious to the respiratory system when compared with exposure to combustible tobacco smoke. However, initiation of e-cigarette use by a person who has never smoked may cause harm to the respiratory system compared with never using e-cigarettes, particularly if initiation of e-cigarettes occurs at a young age. Therefore, understanding the health effects of e-cigarettes is dependent on the context of age, current and prior use of combustible tobacco products, and whether the user has pre-existing lung conditions such as COPD and asthma. In addition, there is a need to examine the short- and long-term effects of secondhand and thirdhand e-cigarette aerosols on the respiratory health of non-users, which can settle on hard surfaces. Infants and preschool children who live with e-cigarette users may be at higher risk for secondary exposures because this age group spends much of their time in the residence of the e-cigarette user. Finally, exposure of the dual user to both combustible tobacco products and e-cigarette aerosols may cause unique health risks to the respiratory system[26].

E-CIGARETTES AND CARDIOVASCULAR RISK:

Besides their potential negative health effects on users, there is increasing evidence that e-cigarettes emit considerable levels of toxicants, such as nicotine, volatile organic compounds, and carbonyls, in addition to releasing particulate matter(PM). Thus, they possess a potential harm to nonusers either through secondhand or thirdhand exposure. This is especially the case in vulnerable populations, such as children, elderly, pregnant females, and those with a history of cardiovascular disease.

Cardiovascular disease is the major cause of death among smokers and is responsible for as much as 30% of heart disease related deaths in each year. As smokers considered safer alternatives to help them quit, they started using e-cigarettes, in part, because they have lower levels of harmful constituents. In the paramount to evaluate e-cigarettes short- and long-term safety on the cardiovascular system, especially given the limited studies in this area and/or their controversial findings. Several studies suggest that e-cigarette use acutely and negatively impacted vital signs, such as heart rate and blood pressure. In this regard, the heart rate acutely increased after the use of e-cigarette by smokers. Additionally, in another study they evaluated that e-cigarettes elevated both diastolic blood pressure and heart rate in smokers, but to a lesser extent when compared with tobacco cigarettes.

It was also found that endothelial cell dysfunction and oxidative stress, which play important roles in the pathogenesis of cardiovascular disease, are associated with e-cigarettes, even a single use, but the effect was less pronounced compared to cigarette smoking. On the other hand besides tobacco smoking, e-cigarettes caused a comparable and rapid increase in the number of circulating endothelial progenitor cells, which could be attributed to acute endothelial dysfunction and/or vascular injury. Consequently, e-cigarette vapour extracts were found to enhance activation (aggregation and adhesion) of platelets from healthy human volunteers.

Impact of Nicotine on CVS: Nicotine, which is the major constituent in most smoking products, is considered a strong alkaloid that can be absorbed by various routes: oral mucosa, lungs, skin, or gut. After absorption, nicotine is metabolised by the liver into cotinine as one of the metabolite. Most e-liquids contain nicotine at concentrations that vary between 0 and 36.6 mg/mL. Studies with conventional cigarettes showed that nicotine increased the risk of cardiovascular disease in smokers, including the development of acute coronary disease, elevated blood pressure, and heart failure. As far nicotine effects on thrombogenesis, it seems to be controversial, with studies suggesting it to be elevated, reduced, or not affected; but this discrepancy could be attributed to

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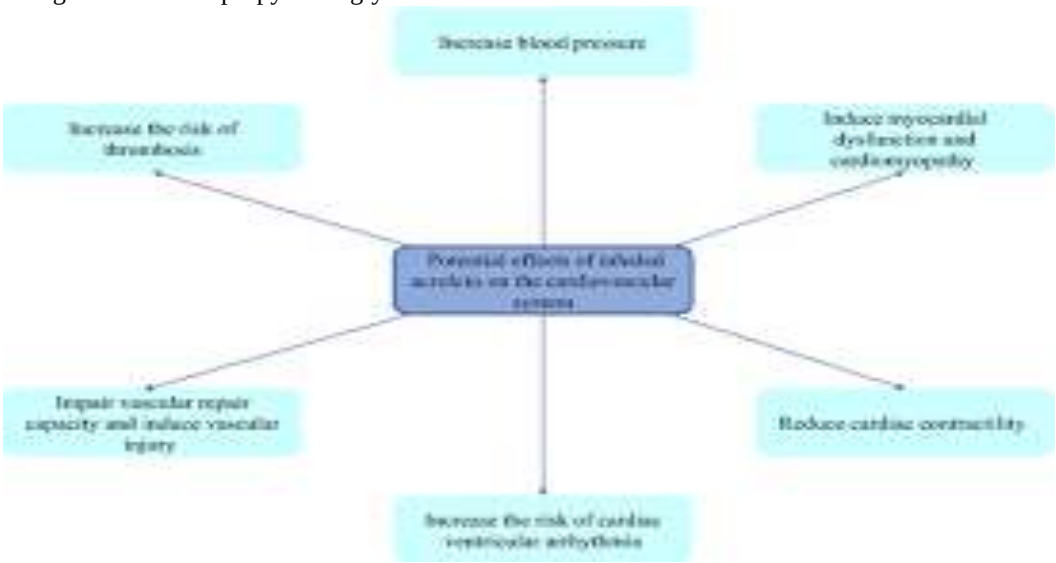
the dose of nicotine used, route of administration, and the method used to measure platelet function. And futher investigation is warranted to address and better understand the short- and long-term effects of nicotine delivered by e-cigarettes on the cardiovascular system.

Impact of Carbonyl Compounds on CVS: In addition to nicotine, e-cigarettes emit other potentially harmful constituents like carbonyls; this includes aldehydes, such as formaldehyde, acetaldehyde, and acrolein, which result from thermal degradation of propylene glycol and glycerol(most commonly used e-liquids). Some studies suggest that exposure to the aldehydes have negative effects on cardio vascular system. Exposure from smoking and other sources to acrolein, the other carbonyl, is associated with a wide range of cardiovascular toxicity. Thus, inhalation of only 3ppm of acrolein caused an increase in systolic, diastolic, and mean arterial blood pressure. Another human study revealed that correlation between levels of acroleinmetabolite (ie., 3-HPMA) and platelet leucocyte aggregates, in addition to increased risk of cardiovascular diseases.



Effects of acrolein on the cardiovascular system.

Wide ranges of cardiovascular effects of acroleininhalation from smoking and ambient air pollution are reported in studies.

Impact of Particulate matter(PM) on CVS; Another health concern related to e-cigarette usage is the generation of fine and ultrafine particles, known as PM, which represents the solidand liquid particles suspended in the air. PM2.5, which includes particles with a diameter of 2.5µm or less, will be the focus of this section because of their small size; this enables them to easily penetrate airways and reach circulation, thereby causing a potential hazard to the respiratory and cardiovascular systems.

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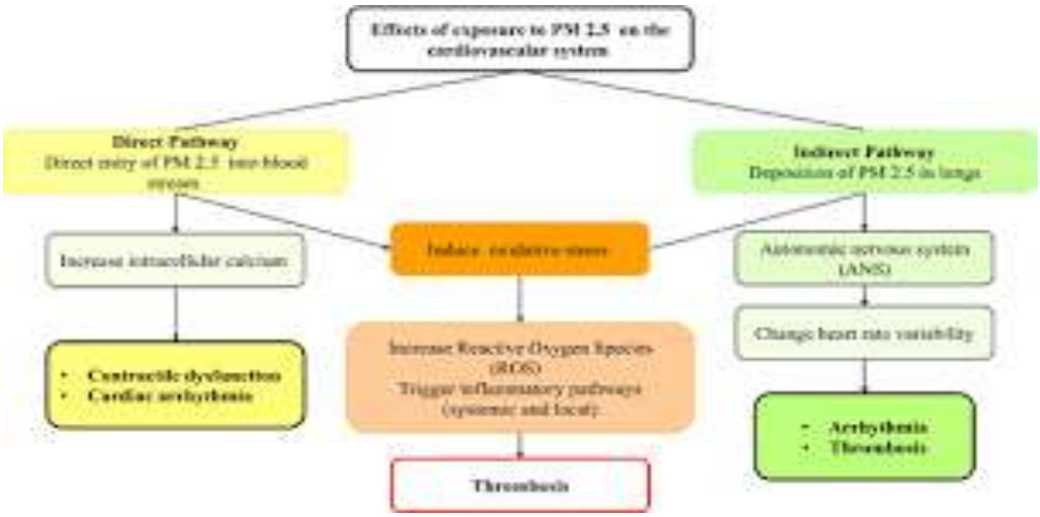
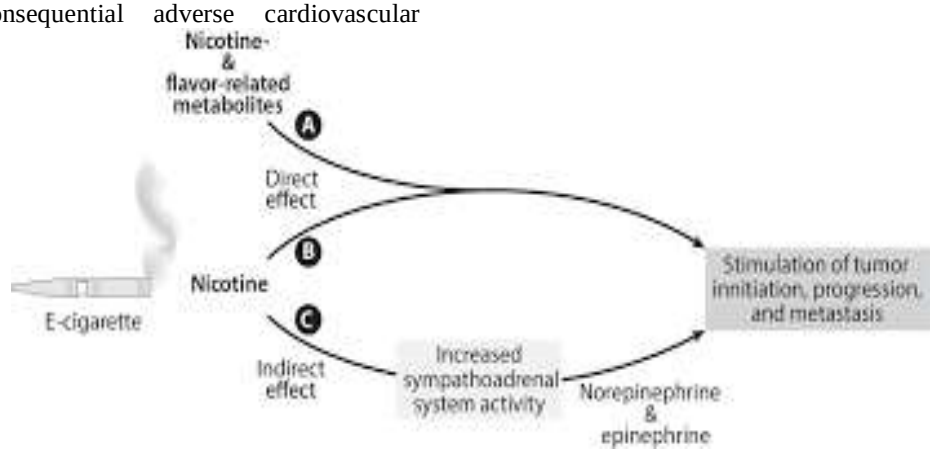


Effects of particulate matter (PM2.5) on the cardiovascular system. PM2.5 exposure from tobacco and environment/ambient negatively affects the cardiovascular system either directly or indirectly. The direct pathway is mediated by the delivery of PM2.5 into the bloodstream. The indirect pathway is attributed to deposition of PM2.5 in lungs and a modulation of autonomic nervous system. Oxidative stress is triggered by both pathways and induces local and systemic inflammatory processes. PM2.5 indicates particulate matter less than 2.5 microns in diameter.

Importantly, it has been found that the dose response relationship between PM exposure and cardiovascular mortality is also nonlinear, and that a consequential adverse cardiovascular outcome can happen as a result of exposure to low levels. Based on these considerations, it is important to examine the negative health effects of short- and long-term (active and passive) exposure to e-cigarettes PM2.5[27]

E-CIGARETTES AND CANCER:

E-cigarettes deliver substantially lower levels of tobacco specific nitrosamines that cigarettes has been basis for the assumption that e-cigarettes pose much lower cancer risk[29]. However, the potential cancer related effects of increased activation of the sympathoadrenal system induced by the e-cigarettes are completely overlooked.



Nicotine may exert direct and indirect effect on inducing cancer. The above mechanism may connect the use of e-cigarettes and a increased risk for cancer development, as well as their stimulatory effect on cancer progression. The data available suggest that activation of the sympathetic nervous system by nicotine inhaled from e-cigarettes may stimulate metastasis development and growth by several mechanisms[29].

The cancer risk associated with the use of electronic cigarettes hypothetically would be expected to be less than combustible tobacco cigarettes based on rationale that e-cigarettes include nicotine from tobacco-but not all the other

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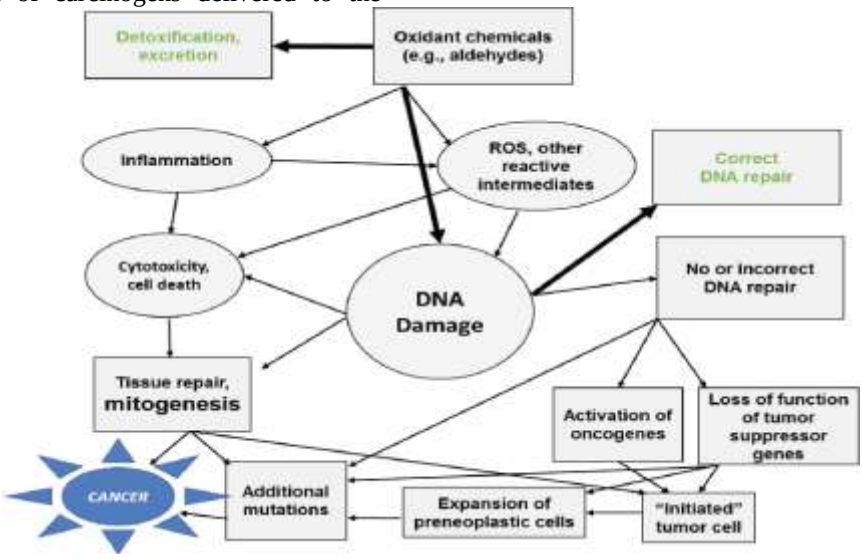
tobacco constituents-and would therefore result in a reduced burden of carcinogens delivered to the user.



Frame work of plausible pathways, including mechanisms and intermediate outcomes, by which exposure to e-cigarettes influence cancer outcomes. NOTE; ROS= reactive oxygen species.

As shown in the above figure, the etiology of cancers induced by environmental exposures is a complex, multistep process that generally takes several years to develop. There are several biologically plausible pathways for which components of e-cigarette aerosols could conceptually influence cancer development. Numerous compounds identified in e-cigarette aerosols can cause ROS, and can be converted to reactive intermediates capable of binding to DNA. Oxidative damage to DNA, and/or the direct adduction of reactive molecules to DNA, such as can occur with formaldehyde, is the most important intermediate outcome of chemical carcinogenesis. Thus, the presence of formaldehyde and other potentially mutagenic and cytotoxic constituents provides biologically relevant mechanisms whereby long-term use of e-cigarettes could affect cancer risk[26].

Chemicals Emitted In E-Cigarette Vapors And Their Potential Health Effects:

	Chemical	**Detected Concentration Range**	**Biological System Affected**
	Nicotine	ND to 36.6 mg/mL	Lung tumor Promoter Addiction Gastrointestinal Carcinogen Raises blood pressure & heart rate Reduce brain development in adolscents
	Cotinine	NDa	Reduces fertility & reproduction
	Acetaldehyde	0.11 to 2.94 µg/ 15 puffs	Carcinogen Aggravation of alcohol induced liver damage

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Aldehydes	Acrolein	0.044 to 6.74 µg/ 15 puffs	Ocular irritation Respiratory irritation Gastrointestinal irritation
	Formaldehyde	0.2 to27.1 µg/ 15 puffs	Carcinogen Bronchitis, pneumonia and increase risk of asthma in children Ocular, nasal, and throat irritant
	o-Methyl benzaldehyde	ND to 7.1 µg/ 15 puffs	Unknown
	Acetone	ND to 91.2	Gastric distress Weakness of extremities Headache Ocular irritation
Volatile organic compounds	Propylene glycol	0 to 82.875 mg/ 15 puffs	Throat and airways irritation Carcinogen Gastric distress Increase asthma risk in children Ocular irritation
	Glycerine	75 to 225 µg/ 15 puffs	Lipoid pneumonia Ocular, dermal, and pulmonary irritant
	3-Methylbutyl-3-methylbutanoate	1.5 to 16.5 µg/ 15 puffs	Unknown
	Toulene	<0.63 µg/ 15 puffs	CNS damage Renal damage
Nitrosamines	NNN	0.8 to 4.3 ng/ e-cigarette	Carcinogen
	NNK	1.1 to 28.3 ng/ e-cigarette	Carcinogen
Metals	Chromium	ND to 0.0105 µg/ 15 puffs	Pulmonary irritation and inflammation Nasal mucosa atrophy and ulcerations Reduces fertility and reproduction
	Cadmium	ND to 0.022 µg/ 15 puffs	Increased risk of lung cancer Pulmonary and nasal irritation
	Lead	0.025 to 0.57 µg/ 15 puffs	Hypertension induction Renal damage CNS damage
	Nickel	0.0075 to 0.29 µg/ 15 puffs	Carcinogen CNS and pulmonary damage Renal and hepatic toxicity

ND indicates not detected; CNS, central nervous system; NNK, 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone; NNN, N-nitrosamines.

Variable concentrations found in plasma after using e-cigarettes[27].

WHY INDIA BANNED e-CIGARETTES?

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On 18 September 2019 India's prime minister Narendra Modi announced the ban of e-cigarettes across the country. The main reasons behind e-cigarette ban include:

-The Indian Council of Medical Research (ICMR) rejected the argument that e-cigarettes might help smokers quit tobacco consumption and recommended complete ban on e-cigarettes. While such benefits have not been firmly established, there is also evidence that there is risk of people continuing to use both them as well as tobacco products. In addition, these devices could encourage non-smokers to get addicted to tobacco.

-The document revealed by ICMR states that use of e-cigarettes has adverse effects on humans, which include DNA damage; carcinogenic, cellular, molecular and immunological toxicity; respiratory, cardiovascular, and neurological disorders; and adverse impact on fetal development and pregnancy.

-Use of ENDS (electronic nicotine drug delivery system) or e-cigarette can open a gateway for new tobacco addiction among the youth. On the balance, these have a negative impact on public health.

-Several studies have found that youths using e-cigarettes and other such devices are more likely to use regular cigarettes later. They increase the likelihood to experiment with regular products and increase the intention to indulge in cigarette smoking.

II. CONCLUSION:

The above article illustrates the prons and cons of e-cigarette use among the youth and how vaping affects the different systems of human body. And several research studies have revealed that adverse effects of e-cigarettes rather than its usefulness. Therefore, India in the year 2019 september 18 took a initiative to ban the consumption, production, manufacturing, import, export, transport, sale, distribution, storage and advertisement of e-cigarettes

REFERENCE:

[1]. National institute of health. What are Electronic cigarettes?. October 2018. https://newsinhealth.nih.gov/2018/10/what-are-electronic-cigarettes

[2]. Explained: What are e-cigarettes? Why did the govt ban them?https://www.google.com/amp/s/www.indiatoday.in/amp/india/story/what-are-e-cigarettes-why-have-they-been-banned-1600452-2019-09-18

[3]. Deborah Leader RN, PHN. The pros and cons of vaping. February 18,2020 https://www.verywellhealth.com/the-pros-and-cons-of-e-cigarettes-915015

[4]. Lindsey Marcellin, MD, MPH. What are the potential harms and benefits of e-cigarettes?. May 28, 2019.https://www.elsevier.com/connect/what-are-the-potential-harms-and-benefits-of-e-cigarettes

[5]. Advantages and disadvantages of electronic cigaretteshttp://www.indochef.com/advantages-and-disadvantages-of-electronic-cigarettes/

[6]. Aditya Kalra. India says e-cigarette ban implies use of devices also prohibited. Nov 18, 2019https://www.google.com/amp/s/mobile.reuters.com/article/amp/idUSKBN1XS1DR

[7]. Swati Gupta. India is banning all e-cigarettes over fears about youth vaping. Sep 18, 2019.https://edition.cnn.com/2019/09/18/health/india-e-cigarette-ban-intl/index.htmlLonna P, Gordon, MD. Vaping:What you need to know.https://kidshealth.org/en/parents/e-cigarettes.html

[8]. National cancer institute. Electronic cigarette.https://www.cancer.gov/publications/dictionaries/cancer-terms/def/electronic-cigarette

[9]. Electronic cigarette images.https://www.quebec.ca/en/health/advice-and-prevention/healthy-lifestyle-habits/electronic-cigarettes/

[10]. National institute of Drug Abuse. Vaping Devices.https://www.drugabuse.gov/publications/drugfacts/vaping-devices-electronic-cigarettes

[11]. Muhammad Aziz Rahman, Nicolas Hann, Andrew M Wilson, Linda Worall-Carter. Electronic cigarettes: patterns of use, health effects, use in smoking cessation and regulatory issues. Tobacco induced diseases 12(1) :21. December 2014https://www.google.com/amp/s/www.researchgate.net/figure/Components-of-an-electronic-cigarette_fig1_269875112/amp

[12]. St. George's University of London. E-cigarettes research shows clear benefits of switching from tobacco.https://www.google.com/amp/s/medicalxpress.com/news/2018-10-e-cigarettes-benefits-tobacco.amp

[13]. First-time vaper's guide to e-cigs & vaping.https://www.logicvapes.us/learn-and-explore/articles/beginners-guide
[14]. Using e-cigarettes to stop smokinghttps://www.nhs.uk/live-well/quit-smoking/using-e-cigarettes-to-stop-smoking/
[15]. Advantages of E-cigarettes/ Disadvantages of E-cigarettehttps://www.rfwireless-world.com/Terminology/Advantages-and-Disadvantages-of-E-Cigarettes.html
[16]. Darush Attar-zahed. The pros and cons of e-cigarettes. 19 january 2015https://www.independentnurse.co.uk/clinical-article/the-pros-and-cons-of-e-cigarettes/72538/
[17]. Health risks of e-cigarettes, smokeless Tobacco, and waterpipes.https://www.cancer.net/navigating-cancer-care/prevention-and-healthy-living/stopping-tobacco-use-after-cancer-diagnosis/health-risks-e-cigarettes-smokeless-tobacco-and-waterpipes
[18]. KostiantynDmytriiev, YuriyMostovoy, NataliiaSlepchenko, NataliiaTsymabaliuk, AndriiSidrorov. Role of e-cigarettes in the smoking cessation. European respiratory journal 2018 52; PA1726.https://erj.ersjournals.com/content/52/suppl_62/PA1726
[19]. Ian Britton, Laura Crotty-Alexander. Smoling cessation/e-cigarettes.https://www.pulmonologyadvisor.com/home/decision-support-in-medicine/pulmonary-medicine/smoking-cessation-e-cigarettes/
[20]. Frank T. Leone. E-cigarettes have uncertain role for smoking cessation. April 2019https://www.healio.com/news/primary-care/20190415/ecigarettes-have-uncertain-role-for-smoking-cessation
[21]. Andrea S Franks, Karen Sando, Sarah McBane. Do electronic cigarettes have a role in tobacco cessation?. Pharmacotherapy 2018 May; 38(5) : 555-568https://pubmed.ncbi.nlm.nih.gov/29573440/
[22]. AruniBhatnagar, PhD, Thomas J. Payne, and Rose Marie Robertson MD. Is there a role for electronic cigarettes in tobacco cessation?. Journal of the American heart association. 2019;8https://www.ahajournals.org/doi/full/10.1161/JAHA.119.012742
[23]. Caitlin Notley PhD, Emma Ward, Lynne Dawkins, Richard Holland. The unique contribution of e-cigarettes for tobacco harm reduction in supporting smoking relapse prevention. Harm reduction journal 15(1); December 2018https://www.researchgate.net/publication/325878922_The_unique_contribution_of_e-cigarettes_for_tobacco_harm_reduction_in_supporting_smoking_relapse_prevention
[24]. Social inequalities in vaping: Why smoking matters.https://blogs.biomedcentral.com/bmcseriesblog/2020/02/10/social-inequalities-in-vaping-why-smoking-matters/
[25]. National academies of sciences, engineering, and medicine; health and medicine divison; board on population health and public health effects of ENDS: Eaton DL, Kwan LY, Stratton K. 2018 Jan 23.https://www.ncbi.nlm.nih.gov/books/NBK507159/#!po=3.91304
[26]. HananQasim, Zubai A. Karim, phD, Jose O, Rivera, Fadi T. Khasawneh, Fatima Z, Alshbool, phD. Impact of electronic cigarettes on cardiovascular system. 30 Aug 2017https://www.ahajournals.org/doi/full/10.1161/jaha.117.006353
[27]. Stanton A. Glantz, PhD. Direct evidence that e-cigs cause cancer; October 20, 2019. https://tobacco.ucsf.edu/direct-evidence-e-cigs-cause-cancer
[28]. Boris Mravec, Miroslav Tibensky, LubicaHorvathova, and Pavel Babal. E-cigarettes and cancer risk. February 2020 https://cancerpreventionresearch.aacrjournals.org/content/13/2/137.full-text.pdf