
E-cigarette, vaping, a looming threat to public health; are we ready?

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ABSTRACT

E cigarette, Vaping, is a new method of smoking nicotine and other substances. It has been entered to the market around 2006-2007 on assumption that it will help smokers of conventional cigarette to effective quit. These devices have gained a popularity not only among smokers but among people who are never smoked before including young adults and students driven by the feverish race of the companies to produce many styles with different flavours. Many issues have been raised; high rate of users among young adults, a gateway for addition on nicotine and other psychoactive recreational substances, and emergence of new epidemic threat on the lungs. The problem of e cigarette is complex and grows quickly. Scientist evidence is not readily available and it is usually lagged behind; however, health authorities and health care providers should act in close collaboration to find accredited answers for many logic questions that people want to know. Iraq is not far away from this health issue and actually it is in the core of detrimental effect of such new community behaviour due to lack of control over the use of such devices and lack of studies on its benefits and risk on the health. This article is going to talk about the growing evidence of the benefits and risk, then to talk about some recommendations adopted by some developed countries and trying put some of them for application in Iraq with a sincere call for our colleagues in respiratory discipline and for the policy makers to start an action.

Key words: e cigarette, vape, electronic cigarette, smoking cessation, e cigarette inducing acute lung injury.

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Historic Background and definition

The first documented reference to an electronic cigarette (e-cigarette) is dated back to 1930, but the first smokeless, non-tobacco cigarette device was patented in the USA by Herbert A. Gilbert in 1965. However, it is not commercialized till 1980s on a limited scale.¹ In 2003, a Chinese pharmacist, Hon Lik, was credited with the first-generation e-cigarette that used a piezoelectric element to vaporize the liquid containing nicotine diluted in a propylene glycol solution progressively e cigarette has entered the USA and European market in 2006 then the infection passed to all other countries.² This non-tobacco cigarette was thought to be a safe and harmless method of smoking.

E-cigarette (vape) is an electronic device used to deliver nicotine or any other substance through a process of aerosolization. The principle of work is to produce an aerosol by heat-

ing a liquid that contain a solvent, flavouring substance, with nicotine then rapidly cooling it. Vaping devices have many street names, including e-cigs, e-hookahs, vape pens, mods, vapes, and tank systems. So many brands of e cigarette have been produced in the world; however, they share similar parts which are a battery, a reservoir containing the liquid, and a vaporization chamber with heating element.³ the e liquid contains a solvent (propylene glycol or vegetable glycerin), flavourings (eg, tobacco, mint, fruit, bubblegum), and often, nicotine in various doses typically ranging from 3-50 mg/ml.

Progressively, using e cigarette gained more interest among smokers and non-smokers alike over the use of other Food and Drug Administration (FDA) approved forms of nicotine replacement therapy. This may be attributed to the rapidity serum nicotine peaks (about 5 minutes) after vaping the aerosol from the e ciga-

rette and the shape of it which gives the user a similar experience to that of using the conventional cigarette.⁴

E- cigarette and smoking cessation:

E-cigarette has been proposed as a method to minimize the undoubted risk of conventional cigarette smoking on health especially the respiratory system. However, in September 2008, the World Health Organization (WHO) has stated that e-cigarette does not consider to be a legitimate smoking cessation aid.⁵ subsequently, money countries like Turkey, Australia, Jordan, Canada and others have banned e-cigarette from their markets in years 2008-2011.

This initial negative perception has been counteracted by the positive results of money studies in terms of the effect as an aid for smoking cessation. In 2011, a study published in the American Journal of Preventive Medicine reported that e-cigarettes are a promising tool to help smokers quit, producing six-month abstinence rates that are better than those for traditional nicotine replacement products.⁶

Similarly, another study provided a strong evidence that e-cigarettes are being used with success by many smokers to quit smoking or cut down substantially on the number of cigarettes they consume, and that e-cigarettes are being used with success by many ex-smokers to remain off cigarettes.⁷ on the same line, a clinical trial reported that e-cigarettes may be more effective than traditional nicotine replacement therapy (NRT) products for smoking cessation and may be particularly effective in smokers who are not motivated to quit.⁸ Although Hajek et al⁹ has found that e cigarette is better than nicotine replacement therapy (18 % versus 9.9 %) in stopping smoking after one year of follow up, this explicitly positive effect was on the expense of maintaining the habit of smoking instead of quitting it entirely because he has also reported that 80 % of those who quit by using e-cigarettes continue using them after a year comparing to only 9 % of those who used NRT.

A Cochrane meta-analysis¹⁰ found evidence that e-cigarette help smokers quit compared with placebo e-cigarette, with one trial showing the same (low) effect for e-cigarette and for the nicotine patch. The small number of trials, low event rates and wide confidence intervals

around the estimates mean that the confidence in the result is rated “low” by GRADE (Grading of Recommendations, Assessment, Development and Evaluations) classification of the quality of evidence. So, the task force report from the European Respiratory Society states that the evidence is limited and further studies are needed, especially studies that compare e-cigarettes with licensed stop-smoking treatments.¹¹

Propaganda for e-cigarette and effect on youth

The popularity of using e-cigarette has led to a frenetic competition among the companies to produce many styles with many flavours, in addition to aerosolize substances other than nicotine like tetrahydrocannabinol (THC). This feverish race of the companies has been reflected not only on using the vape as a tool for quitting of traditional tobacco smoking but on driving people who were initially non-smokers or students to start vaping early in their life. This dangerous trigger has led the US Surgeon General in December 2018 to declare e-cigarette vaping among adolescents an “epidemic.”¹² Also For youth, it may be a gateway to addiction to nicotine and other substances. In a 2018 survey,¹³ 20.8% of high school students reported using e-cigarettes on more than 1 day in the previous 30 days; a significant increase from 1.5% in 2011. The risk is extended to involve pregnant women where in Oklahoma and Texas, 1.4 % of women has reported that they have used e-cigarette during pregnancy.¹⁴

Danger on the health

On the biological level, many studies have shown about 50 % of e-liquids studied were cytotoxic to human pulmonary fibroblast and lung epithelia cells. And Fruit-flavored e-liquids in particular caused a significant increase in DNA fragmentation.¹⁵ evidence is accumulating rapidly and making it increasingly clear that smoking e-cigarette is far from being harmless. An increasing number of studies have used cell culture and animal models to investigate the effects of e-cigarettes. Most of these studies revealed adverse effects of e-cigarettes, although these were less pronounced than with traditional tobacco cigarettes.¹¹

Although e-cigarette aerosol contains a number of potentially toxic chemicals, there is a lack of data on their long-term effects and thus the toxicity of e-cigarette remains to be determined. Therefore, at the present time it cannot be concluded that long-term use of e-cigarette is safer than that of tobacco products.¹¹

The biggest threat announced in July 2019 when health authorities in Wisconsin and Illinois have notified the Centres for Disease Control and Prevention (CDC) about receiving 53 cases of pulmonary disease of unclear cause in patients who were active vape smoking. The possible link has been raised necessitating urgent public health investigations.

The CDC was progressively notified about similar cases reported from 25 states in America. The clinical characteristics of those 53 patients have comprehensively been summarized in the NEJM in September 2019.¹⁶

The CDC in August 2019 has defined surveillance case definitions for confirmed and probable cases of severe pulmonary disease associated with e-cigarette use. The confirmed case is defined as development of pulmonary infiltrate (opacity on plain-film radiograph of the chest or ground glass opacity on chest CT scan) in the absence of pulmonary infection on initial workup in a person who used e cigarette in 90 days before onset of symptoms. The patient should not have an evidence of alternative diagnosis like cardiac, rheumatologic, or neoplastic process. When the clinical team caring for the patient believes that positive infectious screen is not the probable culprit for the pulmonary pathology, the case is defined as being probable.

The study has shown that the mean age of patients was 19 years with, 83 % of them were males. Shortness of breath and cough were reported in more than 82%; about 80 % has reported gastrointestinal tract symptoms like nausea, vomiting or diarrhoea; and 100 % reported constitutional symptoms like subjected fever, malaise or weight loss. A third of the patents had SPO₂ between 88-95 % and another third had below 88 %. Around 50 % were admitted to ICU; a third has been treated by CPAP and about 32 % were intubated. Only one patient has died.

CT scan of the chest showed abnormalities in 100 % of cases in form of bilateral ground glass opacity (GGO) bilateral involving lower

lobes with relative sparing of the subpleural areas. Pneumothorax and pleural effusion have been reported.¹⁶ The following diagnostic possibilities have been recognized including acute eosinophilic pneumonia, organizing pneumonia, acute respiratory distress syndrome, and hypersensitivity pneumonitis.¹⁷

Over the next 3 months (As of December 17, 2019), a total of 2,506 patients has been hospitalized with the diagnosis of e-cigarette, or vaping, product use-associated lung injury (EVALI) were reported to the CDC, fifty-four deaths have been confirmed.¹⁸

Vitamin E acetate has been identified as a chemical of concern among people with e-cigarette, or vaping, product use-associated lung injury (EVALI). Vitamin E acetate was identified in bronchoalveolar lavage (BAL) fluid samples (fluid samples collected from the lungs) from 48 of the 51 EVALI patients, but not in the BAL fluid from the healthy comparison group. THC is present in most of the samples tested by FDA to date, and most patients report a history of using THC-containing products.¹⁸

Where is the challenge now?

- Conventional cigarette smoking is a major public health problem, for example tobacco use is responsible for 480,000 deaths annually in the United States.¹⁹
- E-cigarette has much fewer toxic substances in comparison to conventional cigarette, in addition to the evidence that it may help smokers to quit smoking. Taking in consideration that smoking is extremely difficult to quit, as many as 80% of smokers who attempt to quit resume smoking within the first month.²⁰ though its long-term safety cannot be guaranteed.
- A growing evidence has emerged that e-cigarette has used on a large scale by young adults who have never smoked before, or using it to smoke other psychoactive recreational substances. These social problems added to the notorious September 2019 outbreak of e-cigarette, vaping, induced acute lung injury; an outbreak that is still vague and unfolded.

The urgent question now is what is the proper advice health authorities and caring physicians should give to the people in such situa-

Table 1: the CDC and FDA recommendation of December 2019 about e-cigarette

- People should not use THC-containing e-cigarette, or vaping, products, particularly from informal sources like friends, family, or in-person or online sellers.
- Vitamin E acetate should not be added to e-cigarette, or vaping, products. Additionally, people should not add any other substances not intended by the manufacturer to products.
- While it appears that vitamin E acetate is associated with EVALI, there are many different substances and product sources that are being investigated and may be implicated. Therefore, the best way for people to ensure that they are not at risk while the investigation continues is to refrain from the use of all e-cigarette, or vaping, products.
- Adults using e-cigarettes or vaping products as an alternative to cigarettes should not go back to smoking. They should contact their healthcare provider if they need help quitting tobacco products, including e-cigarettes.
- Adults who continue to use an e-cigarette, or vaping, product should carefully monitor themselves for symptoms and see a healthcare provider immediately if they develop symptoms like those reported in this outbreak.
- E-cigarette, or vaping, products should never be used by youths, young adults, or women who are pregnant.
- Adults who do not currently use tobacco products should not start using e-cigarette, or vaping, products. There is no safe tobacco product. All tobacco products, including e-cigarettes, carry a risk.
- THC use has been associated with a wide range of health effects, particularly with prolonged frequent use. The best way to avoid potentially harmful effects is to not use THC-containing e-cigarette, or vaping, products.

tion, where you have some benefits over an established danger “conventional smoking” but with uncertainty of the future risk?

Latest international recommendations

table 1 and 2 show the recommendation of the CDC and FDA in the USA¹⁸ and The NICE guideline of the UK.²¹

The situation in Iraq?

The situation in Iraq is rather complex. We need a coordinated work on a state level, on a health authority level, and on health care providers level supported by the media. This work should be made as early as possible.

On a national level:

1. Prohibition of all types of e cigarette containing substances other than nicotine like tetrahydrocannabinol.
2. Prohibit e cigarette containing vitamin E acetate or other substance which proved in the

future to be a culprit.

3. Treat e-cigarette in a similar way as conventional cigarette for example banning advertisements promoting smoking e-cigarette, restrict age for buying, or adding tax on them.

On Health authority level:

1. Establish a scientific committee includes respiratory physicians and public health physician to follow up this thread and issuing updated recommendations, and encouraging studies in this field.
2. Run an educational programme in association with mass media to educate publics about the danger of e cigarette on the society and the health.
3. Start smoking cessation clinics in big hospitals.
4. Start a process of registration of the suspected cases.

On caring physician:

1. Advice against starting vaping among those

Table 1: the NICE guideline of March 2018 about e-cigarette

- For people who smoke and who are using, or are interested in using, a nicotine-containing e-cigarette on general sale to quit smoking, explain that
- Although these products are not licensed medicines, they are regulated by the Tobacco and Related Products Regulations 2016
- Many people have found them helpful to quit smoking cigarettes
- People using e-cigarettes should stop smoking tobacco completely, because any smoking is harmful.
- Evidence suggests that e-cigarettes are substantially less harmful to health than smoking but are not risk free
- The evidence in this area is still developing, including evidence on the long-term health impact.

Dear Colleagues

Please, notify the **Iraqi Centre for Pharmacovigilance/** Ministry of Health about any suspected case of e-cigarette associated lung injury.

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Mobile: 07807820490.

who have never smoked before

2. Still endorse using e-cigarettes as a temporary tool to help quitting smoking of conventional cigarettes.
3. Advice against using vape of unknown origin, vape with suspicious substance, vape with psychoactive recreational drugs, or using vitamin E acetate.
4. Advice against continuing conventional cigarettes smoking in addition to e-cigarettes.
5. Advice against using e devices vaporizing high concentration of nicotine.

In conclusion e-cigarette is far from being harmless despite some benefits in term of helping for stopping of smoking conventional cigarettes. It has many social problems with an association with a vague lung injury reported in the USA. We should be ready, as a health care providers, to report any suspected case of e-cigarettes associated lung injury and to intervene in close collaboration with health authority.

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Abbreviation list: Bronchoalveolar lavage (BAL), Centres for Disease Control and Prevention (CDC), Continuous positive airway pressure (CPAP), Grading of Recommendations, Assessment, Development and Evaluations (GRADE), Ground glass opacity (GGO), E-cigarette, or vaping, product use-associated lung injury (EVALI), Electronic cigarette (e-cigarette), Food and Drug Administration (FDA), Intensive care unit (ICU), National Institute for Health and Care Excellence (NICE), Nicotine replacement therapy (NRT), Tetrahydrocannabinol (THC), United States of America (USA), World Health Organization (WHO).

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