


Nicotine Delivery of E-Cigarettes

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Cite this article as: Akpınar EE. Nicotine Delivery of E-Cigarettes. Turk Thorac J 2020; 21(1): 73-4.

Dear Editor,

Electronic cigarettes (e-cigarettes) are new tools that are serving as an alternative to conventional cigarettes. Many smokers are using them either to quit or reduce smoking; furthermore, e-cigarettes enable substitution of conventional cigarettes in a smoke-free environment. Nicotine, the main addictive component in conventional cigarettes, is delivered from e-cigarettes as well. Several factors may influence nicotine delivery from e-cigarettes such as nicotine concentration of the e-liquid, base ratio of propylene glycol/vegetable glycerin, type of the device used, and behavior of the user. The contents of e-cigarette other than nicotine (e.g., flavor, sweetener, and pH) may also contribute to the variability in nicotine delivery from e-cigarettes [1]. Cotinine is the major end product of nicotine, and measurement of its levels in saliva, serum, or urine acts as an indirect tool for evaluating nicotine delivery [2].

Aslan et al. [3] have recently published an article in Turkish Thoracic Journal in which they measured carbon monoxide levels in the expired air and urinary cotinine levels in e-cigarette users. The aim of this letter is to emphasize some points about the method of their study that may have confounded the results. The use of nicotine replacement therapy, smokeless tobacco, or other tobacco containing products (e.g., pipe, cigar, and hookah) was not considered in exclusion criteria. Thus, results may be influenced by the presence of other sources of cotinine. Previous studies have considered this important point, as reported by Marsot and Simon in their review of nicotine and cotinine levels with e-cigarette [2]. Another limitation of the study was lack of a control group. For example, Göney et al. [4] compared urinary cotinine levels of e-cigarette users with those of passive smokers and conventional cigarette users to show that e-cigarette users are exposed to nicotine as much as cigarette smokers. The comparison of urinary cotinine levels between e-cigarette users and conventional cigarette users could be more convenient for investigating the nicotine delivery of these devices.

Nicotine is mainly metabolized in liver. Thus, pharmacokinetics of nicotine may be affected by the use of drugs. In Aslan et al. [3] study, almost half of the participants (n=8/20) had concomitant diseases, including diabetes and hepatitis, and 7 of the 20 participants were regular users of medications. Exclusion of participants who were taking drugs and had any disease that may affect nicotine metabolism could be a more appropriate study design. Measurement of urine cotinine levels without considering creatinine levels may also have misled the results [4]. Aslan et al. [3] used an assay that evaluates spot urine cotinine levels without considering the impact of creatinine on the results.

Because e-cigarettes are being frequently used worldwide as an alternative device of nicotine delivery, their harmful effects on both users and those who are passively exposed to them should be clarified in future studies to prevent misleading of the public by manufacturers. Moreover, future studies are necessary to determine the effects of characterizing attributes of e-cigarettes on nicotine delivery for a harm reduction strategy and to enable the use of these devices as a bridge to quit smoking rather than a new addictive tool.

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Received: 11.05.2019

Accepted: 25.07.2019

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Author's Reply

Re: Nicotine Delivery of E-Cigarettes

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Dear Editor,

First, we would like to cordially thank the author(s) for their comments. These comments have provided us an opportunity to review our manuscript again.

We would like to share our perspective in this regard.

We acknowledge the mainly descriptive nature of the study, which has also been specified as a limitation in the manuscript [1]. Detailed analyses, including the variables pointed out in the "Letter to the Editor," could not be performed due to this limitation. All the criticized and pointed variables can be included in the analyses in a future study, where the number of the participants is higher. Yet we strongly think that the significant and moderate correlation between e-liquid reserve amount and urine cotinine levels is worth reporting even in such a small group of participants.

Regarding the discussion on "harm reduction" strategy, it is one of the methods that tobacco industry has been frequently using since decades to increase its market worldwide by shifting the focus to other "new" tobacco products rather than cigarette smoking [2]. "Low tar," "less harmful," and other similar phrases are purposely used in this regard. Such tactics are frequently being promoted in middle- and low-income countries in which the Framework Convention on Tobacco Control (FCTC) recommendations are not strictly implemented [3]. According to FCTC, electronic nicotine delivery systems include e-cigarettes and there has been an increasing trend in the use of e-cigarettes [4].

Because the "safety" of e-cigarettes (or electronic nicotine delivery systems in general) has not been proven scientific-

ly [5], health professionals and scientific community should be more careful and cautious than usual while discussing such topics or responding to questions on these. Aslan et al. with their limited participants' data were careful in interpreting their data [1]. One of the reasons for not considering creatinine correction for the limited participants in the study was the presence of inverse conclusion about the subject [6,7]. The reasons were well explained in the study conducted by Jatlow et al. [8].

As a last point, let us not forget the ethical responsibility of the scientists. Emphasizing the precautionary principle (PP) in harm reduction-related discussion(s) will be a good contribution regarding this point. The PP gives responsibility to the scientists to call for proactive measures to prevent any serious harm in case of uncertainty [9]. On this strong basis, the risk to deceive the community should be avoided by comparing the results with non-smokers' data in any study conducted on/with a tobacco product.

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Received: 03.07.2019

Accepted: 25.07.2019

Cite this article as: Aslan D, Gürbay A, Hayran M, et al. Re: Nicotine Delivery of E-Cigarettes. *Turk Thorac J* 2020; 21(1): 74.

DOI: 10.5152/TurkThoracJ.2019.192208

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