



Document details

< Back to results | 1 of 1

↗ Export Download Print E-mail Save to PDF Add to List More... >

[Full Text](#) View at Publisher

Optometry and Vision Science
Volume 96, Issue 9, 1 September 2019, Pages 678-685

The Tear Function in Electronic Cigarette Smokers (Article)

Md Isa, N.A. ✉, Koh, P.Y., Doraj, P. 👤

National Institute of Ophthalmic Sciences, Lorong Utara (B), Petaling Jaya, Malaysia

Abstract

View references (56)

SIGNIFICANCE Prominent ocular surface dryness and poor tear film quality among electronic cigarette (e-cigarette) smokers (or vapers) indicate potential harm to the eyes from vaping. These findings may serve as precautionary signs for e-cigarette users and exposed bystanders. **PURPOSE** Little is known about the effect of e-cigarettes on the eyes except for reported eye irritation among individuals who were exposed to e-cigarette vapors and e-liquids. This study aims to investigate the effect of vaping on ocular surface health of long-term vapers. **METHODS** Twenty-one vapers and 21 healthy nonsmokers who are all male underwent measurements of the Ocular Surface Disease Index, noninvasive tear breakup time, fluorescein breakup time, ocular surface staining, tear meniscus height, and the Schirmer test. The effect of voltage used during vaping was also evaluated against the measurements. **RESULTS** Vapers experienced moderate-to-severe eye dryness (25.0 [interquartile range, 14.6 to 43.7]) as indicated by the Ocular Surface Disease Index. Significant reductions of noninvasive tear breakup time (3.13 ± 0.97 vs. 6.57 ± 2.31 seconds; $P < .0001$), fluorescein breakup time (2.68 [interquartile range, 2.33 to 3.18] vs. 4.12 [3.56 to 5.07] seconds; $P < .0001$), and tear meniscus height (203.0 [193.0 to 225.5] vs. 235.0 [210.0 to 253.50] μm ; $P = .002$) were noted in vapers, but the Schirmer test showed higher results (14.5 [12.0 to 17.0] vs. 8.0 [7.0 to 11.0] mm; $P = .001$) compared with nonsmokers. Increase in vaping voltage aggravated the dry eye symptoms and tear instability ($P < .05$). Higher Schirmer test result was also noted as voltage increases. **CONCLUSIONS** Vapers showed moderate-to-severe symptomatic dry eye and poorer tear film quality compared with nonsmokers. High vaping voltage may have aggravated the dry eye syndrome because of hazardous by-products from pyrolysis of the e-liquid constituents. Investigation of the ocular surface health at cellular and molecular levels is warranted to gain a deeper understanding on the effect of e-cigarette to the eyes. © 2019 American Academy of Optometry.

SciVal Topic Prominence ⓘ

Topic: Vaping | Electronic Nicotine Delivery Systems | Tobacco

Prominence percentile: 99.914 ⓘ

Chemistry database information ⓘ

Substances



Metrics ⓘ View all metrics >

2 Citations in Scopus

71st percentile

1.00 Field-Weighted
Citation Impact



PlumX Metrics

Usage, Captures, Mentions,
Social Media and Citations
beyond Scopus.

Cited by 2 documents

The effect of electronic cigarette smoking on retinal microcirculation: Enlargement of the foveal avascular zone

Kalayci, M. , Cetinkaya, E. , Suren, E.
(2020) *Photodiagnosis and Photodynamic Therapy*

Ocular conditions and dry eye due to traditional and new forms of smoking: A review

Makrynioti, D. , Zagoriti, Z. , Koutsojannis, C.
(2020) *Contact Lens and Anterior Eye*

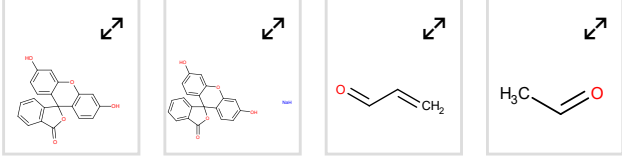
View all 2 citing documents

Inform me when this document is cited in Scopus:

[Set citation alert >](#)

Related documents

Surface chemistry of electronic cigarette electrical heating coils: Effects of metal type on



propylene glycol thermal decomposition

Saliba, N.A. , El Hellani, A. , Honein, E. (2018) *Journal of Analytical and Applied Pyrolysis*

Indexed keywords

Engineering controlled terms:

Smoke

Engineering uncontrolled terms

Break-up time

Cigarette smokers

Disease index

Inter quartile ranges

Measurements of

Molecular levels

Potential harm

Voltage increase

Engineering main heading:

Tobacco

EMTREE medical terms:

adult

adverse event

cross-sectional study

dry eye

electronic cigarette

human

lacrimal apparatus

lacrimal fluid

male

pathophysiology

physiology

pilot study

questionnaire

smoking

young adult

MeSH:

Adult

Cross-Sectional Studies

Dry Eye Syndromes

Electronic Nicotine Delivery Systems

Humans

Lacrimal Apparatus

Male

Pilot Projects

Smoking

Surveys and Questionnaires

Tears

Young Adult

Hot Wires and Film Boiling: Another Look at Carbonyl Formation in Electronic Cigarettes

Talih, S. , Salman, R. , Karam, E. (2020) *Chemical Research in Toxicology*

Main factors affecting aerosol component releases from e-cigarette | 电子烟气溶胶成分释放的主要影响因素

Liu, H. , Zhang, Y. , Lu, Y. (2020) *Tobacco Science and Technology*

View all related documents based on references

Find more related documents in Scopus based on:

Authors > Keywords >

ISSN: 10405488

CODEN: OVSCE

Source Type: Journal

Original language: English

DOI: 10.1097/OPX.0000000000001422

PubMed ID: 31479023

Document Type: Article

Publisher: Lippincott Williams and Wilkins

References (56)

View in search results format >

All Export Print E-mail Save to PDF Create bibliography

- 1 Institute for Public Health. Tabacco &E-Cigarette Survey Among Malaysian Adoloscents (TECMA); 2016 <http://iku.moh.gov.my/images/IKU/Document/REPORT/TECMA2016/TabaccoandECigarette.pdf>. Accessed January 4, 2018

- 2 Galor, A., Lee, D.J. Effects of smoking on ocular health

(2011) *Current Opinion in Ophthalmology*, 22 (6), pp. 477-482. Cited 42 times. doi: 10.1097/ICU.0b013e32834bbe7a

View at Publisher