

How effective are electronic cigarettes for reducing respiratory and risk in smokers? A systematic review

Maciej L. Goniewicz, Connor Miller, Edward Sutanto, Dongmei Li

Supplementary Materials

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Table S1. Summary of Search Results (conducted on September 17th, 2020)

Database	Platform	Years covered	Items found
Medline	PubMed	1946 – current	3,776
Embase	Embase.com	1974 - current	2,008
Total			5,784
Total with Duplicates removed			4,277

Table S2. PubMed run (conducted on September 17th, 2020)

Search	Query	Item Found
#3	#1 AND #2	2,008
#2	(Stroke*[tiab] OR Myocard*[tiab] OR Heart attack* OR Coronary[tiab] OR Diabetes[tiab] OR Cardiovascular[tiab] OR pulmonary[tiab] OR respiratory[tiab] OR asthma*[tiab] OR wheez*[tiab]))	2,591,969
#1	((Electronic Nicotine Delivery System*[tiab] OR E-cig*[tiab] OR ENDS[tiab] OR Vape[tiab] OR Vaping[tiab] OR Electronic cigarette*[tiab]))	64,987

Table S3. Embase run (conducted on September 17th, 2020)

Search	Query	Items Found
#3	#1 AND #2	3,776
#2	‘Stroke*’:ab,ti OR ‘Myocard*’:ab,ti OR ‘Heart attack*’:ab,ti OR ‘Coronary’:ab,ti OR ‘Diabetes’:ab,ti OR ‘Cardiovascular’:ab,ti OR ‘pulmonary’:ab,ti OR ‘respiratory’:ab,ti OR ‘asthma*’:ab,ti OR ‘wheez*’:ab,ti	3,602,2017

#1	'Electronic Nicotine Delivery System*':ab,ti OR 'E-cig*':ab,ti OR 'ENDS':ab,ti OR 'Vape':ab,ti OR 'Vaping':ab,ti OR 'Electronic cigarette*':ab,ti	72,630
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Figure S1. Screenshot depicting the Embase run (conducted September 17th, 2020)

Embase®

Search Emtree Journals **Results** My tools Register Login (1) ?

Results

Select Language ▼

#1 AND #2

Search > Mapping ▾ Date ▾ Sources ▾ Fields ▾ Quick limits ▾ EBM ▾ Pub. types ▾ Languages ▾ Gender ▾ Age ▾ Animal ▾ Search tips ▾

Results Filters

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- Sources ▾
- Drugs ▾
- Diseases ▾
- Devices ▾
- Floating Subheadings ▾
- Age ▾
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- Study types ▾

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- ☐ **#3** **#1 AND #2** 3,776
- ☐ **#2** 'stroke':ab,ti OR 'myocard':ab,ti OR 'heart attack':ab,ti OR 'coronary':ab,ti OR 'diabetes':ab,ti OR 'cardiovascular':ab,ti OR 'pulmonary':ab,ti OR 'respiratory':ab,ti OR 'asthma':ab,ti OR 'wheeze':ab,ti 3,602,217
- ☐ **#1** 'electronic nicotine delivery system':ab,ti OR 'e-cig':ab,ti OR 'ends':ab,ti OR 'vape':ab,ti OR 'vaping':ab,ti OR 'electronic cigarette':ab,ti 72,630

3,776 results for search #3 Set email alert Set RSS feed Search details Index miner

☐ **Results** View | Print | Export | Email | Order | Add to Clipboard 1 — 25 >

Select number of items ▾ Selected: 0 (clear) Show all abstracts | Sort by: ☐ Relevance ☒ Publication Year ☐ Entry Date

- ☐ **1** Aerosol regional deposition of **electronic cigarette** emissions using an original ex vivo **respiratory** model
Montigaud Y., Manzotti B., Chevrel S., Leclerc L., Sarry G., Clotagatide A., Pourchez J., Prévôt N.
[In Process] *Journal of Aerosol Science* 2021 151 Article Number 105633 Cited by: 0
Embase [Abstract](#) [Index Terms](#) > Check here to see if UB owns this item Similar records >

Appendix 1. Calculation of Odds Ratios (ORs) for Composite Smoking and Vaping Variables

We calculated OR for composite smoking and vaping variable using the following steps:

1. Point Estimate

For the point estimate, we divided the point estimate of OR exclusive vaper by the point estimate of OR exclusive smoker.

2. 95% Confidence Interval (95% CI)

For the 95% confidence interval, the following formula were used:¹

$$\text{Upper 95\% Confidence Limit (CL)} = e^{\wedge} [\ln(\text{OR}) + 1.96 \sqrt{(1/a + 1/b + 1/c + 1/d)}]$$

$$\text{Lower 95\% Confidence Limit (CL)} = e^{\wedge} [\ln(\text{OR}) - 1.96 \sqrt{(1/a + 1/b + 1/c + 1/d)}]$$

We estimated the value of $\sqrt{(1/a + 1/b + 1/c + 1/d)}$ by using the known 95% confidence intervals for exclusive vaper:

$$\text{Lower 95\% CL_exclusive vaper} = e^{\wedge} [\ln(\text{OR_exclusive vaper}) - 1.96 \sqrt{(1/a + 1/b + 1/c + 1/d)}], \text{ thus}$$

$$1.96 \sqrt{(1/a + 1/b + 1/c + 1/d)} = \ln(\text{OR_exclusive vaper}) - \ln(\text{Lower 95\% CI_exclusive vaper})$$

Accordingly, below is the calculation of OR for Hedman et al.² study:

$$\text{Given OR exclusive vaper} = 1.47 (0.91 - 2.37)$$

$$\text{Given OR exclusive smoker} = 2.55 (2.36 - 2.77)$$

$$\text{Calculated OR} = 1.47 / 2.55 = 0.58$$

Calculated upper 95% CL = $e^{\ln(0.58) + (\ln(1.47) - \ln(0.91))} = 0.94$

Calculated lower 95% CL = $e^{\ln(0.58) - (\ln(1.47) - \ln(0.91))} = 0.36$

Appendix 2. Calculation of Odds Ratios (ORs) for Separate Smoking and Vaping Variable

We calculated OR for separate smoking and vaping variable using the following steps:

1. Point Estimate

For the point estimate, we multiplied the point estimate of OR former smoker and the point estimate of OR all (everyday/someday) vaper then divided by the point estimate of OR all (everyday/someday) smoker. This is the same method of calculation used in Bhatta et al.³ and Alzahrani et al.⁴ study.

2. 95% CI

For the 95% confidence interval, the following formula were used:[1]

$$\text{Upper 95\% CL} = e^{\ln(\text{OR}) + 1.96 \sqrt{(1/a + 1/b + 1/c + 1/d)}}$$

$$\text{Lower 95\% CL} = e^{\ln(\text{OR}) - 1.96 \sqrt{(1/a + 1/b + 1/c + 1/d)}}$$

We calculated the value of $(1/a + 1/b + 1/c + 1/d)$ or Variance by using the known 95% CI for former smoker, all vaper, and all smoker.

$$\text{Lower 95\% CL}_{\text{formersmoker}} = e^{\ln(\text{OR}_{\text{formersmoker}}) - 1.96}$$

$\sqrt{(\text{Var}_{\text{formersmoker}})}$], thus

$$\text{Var}(\text{formersmoker}) = (((\ln(\text{OR_formersmoker}) - \ln(\text{lower 95\% CI_formersmoker}))/1.96) \\ ^2$$

$$\text{Var}(\text{allvaper}) = (((\ln(\text{OR_allvaper}) - \ln(\text{lower 95\% CI_allvaper}))/1.96) ^2$$

$$\text{Var}(\text{allsmoker}) = (((\ln(\text{OR_allsmoker}) - \ln(\text{lower 95\% CI_allsmoker}))/1.96) ^2$$

$$\text{Var}(\log(\text{formersmoker} * \text{allvaper} / \text{allsmoker})) = \text{Var}(\text{formersmoker}) + \text{Var}(\text{allvaper}) + \\ \text{Var}(\text{allsmoker})$$

$$\ln (\text{OR_formersmoker} * \text{OR_allvaper} / \text{ORallsmoker}) = \ln(\text{OR_former smoker}) + \ln \\ (\text{OR_allvaper}) - \ln (\text{OR_allsmoker})$$

Then

$$\text{Upper 95\% CI} = e ^ {[\ln(\text{OR_former smoker}) + \ln (\text{OR_allvaper}) - \ln (\text{OR_allsmoker}) + \\ 1.96 \sqrt{\text{Var}(\text{formersmoker}) + \text{Var}(\text{allvaper}) + \text{Var}(\text{allsmoker})}]}$$

$$\text{Lower 95\% CI} = e ^ {[\ln(\text{OR_former smoker}) + \ln (\text{OR_allvaper}) - \ln (\text{OR_allsmoker}) - \\ 1.96 \sqrt{\text{Var}(\text{formersmoker}) + \text{Var}(\text{allvaper}) + \text{Var}(\text{allsmoker})}]}$$

Accordingly, below is the calculation of OR for each study included in this review:

1. **Bhatta et al.³ study**

Given OR (former smoker) = 1.16 (0.87–1.57)

Given OR (all smoker) = 2.56 (1.92–3.41)

Given OR (all vaper) = 1.29 (1.03–1.61)

Given OR (all vaper vs. all smoker) = $1.29 \times 1.16 / 2.56 = 0.58$

Calculated Var(former smoker) = $((\ln(1.16) - \ln(0.87))/1.96)^2 = 0.021543361$

Calculated Var(all smoker) = $((\ln(2.56) - \ln(1.92))/1.96)^2 = 0.021543361$

Calculated Var(all vaper) = $((\ln(1.29) - \ln(1.03))/1.96)^2 = 0.013187876$

Calculated Var(formersmoker*allvaper/allsmoker) = $0.021543361 + 0.013187876 + 0.021543361 = 0.0562746$

Upper 95% CI = $\exp(\ln(1.16) + \ln(1.29) - \ln(2.56) + 1.96 \times \sqrt{0.0562746}) = 0.93$

Lower 95% CI = $\exp(\ln(1.16) + \ln(1.29) - \ln(2.56) - 1.96 \times \sqrt{0.0562746}) = 0.37$

Thus, OR (95% CI) = 0.58 (0.37-0.93)

2. Alzahrani et al.⁴ study

Given OR (former smoker) = 1.70 (1.51–1.91)

Given OR (all everyday smoker) = 2.72 (2.29–3.24)

Given OR (all someday smoker vs) = 2.36 (1.80–3.09)

Given OR (all everyday vaper) = 1.79 (1.20–2.66)

Given OR (all someday vaper) = 1.16 (0.83–1.62)

A. Calculated OR (all everyday vaper vs. all everyday smoker) = $1.70 \times 1.79 / 2.72 = 1.12$

$$\text{Calculated Var(former smoker)} = (((\ln(1.70) - \ln(1.51))/1.96)^2 = 0.00365646$$

$$\text{Calculated Var(all daily smoker)} = ((\ln(2.72) - \ln(2.29))/1.96)^2 = 0.007708129$$

$$\text{Calculated Var(all daily vaper)} = ((\ln(1.79) - \ln(1.20))/1.96)^2 = 0.041627255$$

$$\begin{aligned} \text{Calculated Var(former smoker*all everyday vaper/all everyday smoker)} = \\ 0.00365646 + 0.041627255 + 0.007708129 = 0.05299184 \end{aligned}$$

$$\text{Upper 95\% CL} = \exp(\ln(1.70) + \ln(1.79) - \ln(2.72) + 1.96 * \sqrt{0.05299184}) = 1.76$$

$$\text{Lower 95\% CL} = \exp(\ln(1.70) + \ln(1.79) - \ln(2.72) - 1.96 * \sqrt{0.05299184}) = 0.72$$

$$\text{Thus, OR (95\% CI)} = 1.12 (0.72-1.76)$$

$$\text{B. Calculated OR (all someday vaper vs. all someday smoker)} = 1.70 \times 1.16 / 2.36 = 0.83$$

$$\text{Calculated Var(former smoker)} = ((\ln(1.70) - \ln(1.51))/1.96)^2 = 0.00365646$$

$$\text{Calculated Var(all someday smoker)} = ((\ln(2.36) - \ln(1.80))/1.96)^2 = 0.019099657$$

$$\text{Calculated Var(all someday vaper)} = ((\ln(1.16) - \ln(0.83))/1.96)^2 = 0.02916943$$

$$\begin{aligned} \text{Calculated Var(former smoker*all someday vaper/all someday smoker)} = \\ 0.00365646 + 0.02916943 + 0.019099657 = 0.05192555 \end{aligned}$$

$$\text{Upper 95\% CL} = \exp(\ln(1.70) + \ln(1.16) - \ln(2.36) + 1.96 * \sqrt{0.05192555}) = 1.31$$

$$\text{Lower 95\% CL} = \exp(\ln(1.70) + \ln(1.16) - \ln(2.36) - 1.96 * \sqrt{0.05192555}) = 0.53$$

$$\text{Thus, OR (95\% CI)} = 0.83 (0.53-1.31)$$

3. Farsalinos et al.⁵ study (using OR for former smoker ≤ 6 years)

Given OR for MI (former smoker) = 2.82 (2.22–3.57)

Given OR for MI (all everyday smoker) = 3.13 (2.63–3.73)

Given OR for MI (all someday smoker) = 2.47 (1.79–3.40)

Given OR for MI (all everyday vaper) = 1.35 (0.80–2.27)

Given OR for MI (all someday vaper) = 1.22 (0.78–1.91)

Given OR for CHD (former smoker) = 1.96 (1.58–2.44)

Given OR for CHD (all everyday smoker) = 1.73 (1.46–2.05)

Given OR for CHD (all someday smoker) = 1.75 (1.32–2.32)

Given OR for CHD (all everyday vaper) = 1.31 (0.79–2.17)

Given OR for CHD (all someday vaper) = 1.13 (0.70–1.83)

A. Calculated OR for MI (all everyday vaper vs. all everyday smoker) = $2.82 \times 1.35 / 3.13 = 1.22$

Calculated Var(former smoker) = $((\ln(2.82) - \ln(2.22))/1.96)^2 = 0.014897658$

Calculated Var(all everyday smoker) = $((\ln(3.13) - \ln(2.63))/1.96)^2 = 0.007885545$

Calculated Var(all everyday vaper) = $((\ln(1.35) - \ln(0.80))/1.96)^2 = 0.071269424$

Calculated Var(formersmoker*alleverydayvaper/alleverydaysmoker) =

$0.014897658 + 0.071269424 + 0.007885545 = 0.09405263$

Upper 95% CL = $\exp(\ln(2.82) + \ln(1.35) - \ln(3.13) + 1.96 \cdot \sqrt{0.09405263}) = 2.22$

Lower 95% CL = $\exp(\ln(2.82) + \ln(1.35) - \ln(3.13) - 1.96 \cdot \sqrt{0.09405263}) = 0.67$

Thus, OR (95% CI) = 1.22 (0.67–2.22)

B. Calculated OR for MI (all someday vaper vs. all someday smoker) = $2.82 \times 1.22 / 2.47 = 1.39$

Calculated Var(former smoker) = $((\ln(2.82) - \ln(2.22))/1.96)^2 = 0.014897658$

Calculated Var(all someday smoker) = $((\ln(2.47) - \ln(1.79))/1.96)^2 = 0.02699022$

Calculated Var(all someday vaper) = $((\ln(1.22) - \ln(0.78))/1.96)^2 = 0.052084605$

Calculated Var(former smoker*all someday vaper/OR_someday smoker)) =

$0.014897658 + 0.052084605 + 0.02699022 = 0.09397248$

Upper 95% CL = $\exp(\ln(2.82) + \ln(1.22) - \ln(2.47) + 1.96 * \sqrt{0.09397248}) = 2.54$

Lower 95% CL = $\exp(\ln(2.82) + \ln(1.22) - \ln(2.47) - 1.96 * \sqrt{0.09397248}) = 0.76$

Thus, OR (95% CI) = 1.39 (0.76-2.54)

C. Calculated OR for CHD (all everyday vaper vs. all everyday smoker) = $1.96 \times 1.31 / 1.73 = 1.48$

Calculated Var(former smoker) = $((\ln(1.96) - \ln(1.58))/1.96)^2 = 0.01209098$

Calculated Var(all everyday smoker) = $((\ln(1.73) - \ln(1.46))/1.96)^2 = 0.007495052$

Calculated Var(all someday vaper) = $((\ln(1.31) - \ln(0.79))/1.96)^2 = 0.06658229$

Calculated Var(formersmoker*allevydayvaper/alldailysmoker)) =

$0.01209098 + 0.06658229 + 0.007495052 = 0.08616832$

Upper 95% CL = $\exp(\ln(1.96) + \ln(1.31) - \ln(1.73) + 1.96 * \sqrt{0.08616832}) = 2.64$

Lower 95% CL = $\exp(\ln(1.96) + \ln(1.31) - \ln(1.73) - 1.96 * \sqrt{0.08616832}) = 0.83$

Thus, OR (95% CI) = 1.48 (0.83-2.64)

D. Calculated OR for CHD (all someday vaper vs. all someday smoker) = $1.96 \times 1.13 / 1.75 = 1.26$

Calculated Var(former smoker) = $((\ln(1.96) - \ln(1.58))/1.96)^2 = 0.01209098$

Calculated Var(all someday smoker) = $((\ln(1.75) - \ln(1.32))/1.96)^2 = 0.020698408$

Calculated Var(all someday vaper) = $((\ln(1.13) - \ln(0.70))/1.96)^2 = 0.059698589$

Calculated Var(formersmoker*allsomedayvaper/allsomedaysmoker) =

$0.01209098 + 0.059698589 + 0.020698408 = 0.09248798$

Upper 95% CL = $\exp(\ln(1.96) + \ln(1.13) - \ln(1.75) + 1.96 \times \sqrt{0.09248798}) = 2.30$

Lower 95% CL = $\exp(\ln(1.96) + \ln(1.13) - \ln(1.75) - 1.96 \times \sqrt{0.09248798}) = 0.70$

Thus, OR (95% CI) = 1.26 (0.70-2.30)

Appendix 3. Reference list of 51 studies excluded after full text screening

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