

# SUPPLEMENTARY FILES FOR “ELECTRONIC CIGARETTES: A SYSTEMATIC REVIEW FOR DENTAL PRACTITIONERS”

## S1 a) Search strategy for each electronic database

<i>PubMed</i>	<p>(("Stomatognathic Diseases"[MeSH Terms] OR "oral disease"[Title/Abstract]) OR ("tooth diseases"[mh] OR "tooth" AND "diseases"[tiab])) OR ("mouth neoplasms"[mh] OR "oral" AND "cancer"[tiab])) OR ("Periodontal Diseases "[mh] OR "periodontal" AND "disease"[tiab])) OR ("dental caries"[mh] OR "dental" AND "lesion" [tiab])) OR ("halitosis"[mh] OR "halitosis" [tiab])) OR ("tongue diseases"[mh] OR "tongue" AND "diseases" [tiab])) OR ("mouth flora"[tiab] OR "oral microbiota"[tiab] OR "oral flora" [tiab])) OR ("mouth lesions" [tiab] OR "intraoral lesions" [tiab])) OR ("oral hygiene"[mh] OR "oral" AND "hygiene" [tiab])) OR ("oral plaque" [tiab])) OR ("oral health prevention" [tiab] OR ("periodont*" [tiab] OR "gingivitis" [tiab] OR "implant" [tiab] ))</p> <p>And</p> <p>("vaping"[mh] OR "nicotine vaping"[tiab] OR "electronic cigarette" AND "smoking"[tiab] OR "Electronic Nicotine Delivery Systems"[mh] OR "electronic cigarettes" [tiab] OR "e-cig" [tiab] OR "Heated Tobacco Products" [tiab] )OR "Heat-not-burn tobacco" [tiab] OR "HTP" )</p>
<i>Embase</i>	<p>('mouth flora'/exp OR 'mouth flora' OR 'dental implant' OR 'implant' OR 'oral hygiene' OR 'mouth lesion'/exp OR 'mouth lesion' OR 'dental' OR ('disease' NEAR/5 (dent* OR gingiv* OR periodon*)) AND ('vaping'/exp OR 'vaping' OR 'electronic nicotine delivery systems'/exp OR 'electronic</p>

	nicotine delivery systems' OR ('electronic cigarettes' NEAR/5 (ends OR 'e cig*')) OR 'heated tobacco products' OR 'heat-not-burn tobacco')
Web of Science	<p>TS=(mouth disease OR oral disease OR (oral NEAR/2 disease) OR tooth disease OR dental disease OR (dental NEAR/2 disease) OR mouth lesions OR intraoral lesions OR (intraoral NEAR/2 lesions) OR mouth cancer OR oral cancer OR (oral NEAR/2 cancer) OR periodontitis OR periodontal disease OR (periodontal NEAR/2 disease) OR dental caries OR dental decay OR (dental NEAR/2 decay) OR halitosis OR bad breath OR (bad NEAR/2 breath) OR tongue OR tongue diseases OR (tongue NEAR/2 diseases) OR mouth flora OR oral microbiota OR (oral NEAR/2 microbiota) OR mouth hygiene OR oral hygiene OR (oral NEAR/2 hygiene) OR dental prevention OR periodontal disease prevention OR (periodontal disease NEAR/2 prevention) OR gingivitis OR gum disease OR implant)</p> <p>and</p> <p>TS=(vaping OR electronic cigarettes smoking OR (electronic cigarettes NEAR/2 smoking) OR electronic cigarettes OR electronic nicotine delivery systems OR (electronic NEAR/2 nicotine delivery systems) OR Heated Tobacco Products OR Heat-not-burn tobacco OR HTP OR Alternative Tobacco Products)</p>
Scopus	"oral disease" OR "oral cancer" OR "halitosis" OR "tongue disease" OR "oral microbiota" OR "oral hygiene" OR "mouth lesion" OR "dental " OR "oral " OR "gingivitis" OR "gum disease" OR "periodontitis" OR "implant" OR "disease" W/7 dent* OR gingiv* OR periodon* AND "vaping" OR "electronic nicotine delivery systems" OR "electronic cigarettes" W/7 ends OR e-cig* OR "Heated Tobacco Products" OR "Heat-not-burn tobacco" OR "HTP"
Google Scholar	Oral disease oral cancer periodontitis gingivitis dental disease tongue disease halitosis oral flora oral hygiene AND vaping  ENDS electronic cigarettes electronic nicotine delivery systems e-cig Heated Tobacco Products  Heat-not-burn tobacco

## S1b) References excluded after the assessment of full texts and reasons for exclusion (N=12)

AUTHOR	TITLE	REASON FOR EXCLUSION
<b>Alqahtani et al. 2020</b>	Electronic nicotine delivery system-induced alterations in oral health via saliva assessment	Communication
<b>Bhayat et al. 2018</b>	Knowledge, attitude and practices of water pipe and e-cigarette smoking among undergraduate dental and oral hygiene students at a South African university	Wrong population and outcome: knowledge of dental students about e-cigs
<b>Carballosa et al. 2021</b>	The Effects of E-cigarette Vapor Exposure, and the Role of $\alpha 7$ Nicotinic Acetylcholine Receptors and Micro-RNA, on the Regeneration Potential of Periodontal Ligament Derived Stem Cells	Dissertation
<b>Holliday et al. 2019</b>	A feasibility study with embedded pilot randomized controlled trial and process evaluation of electronic cigarettes for smoking cessation in patients with periodontitis	The outcome was smoking cessation within the dental office
<b>Mungial et al. 2021</b>	Development of an E-Cigarettes Education and Cessation Program: A South Texas Oral Health Network Study	Pilot study without data
<b>Ye et al. 2020</b>	Inflammatory biomarkers and growth factors in saliva and gingival crevicular fluid of e-cigarette users, cigarette smokers, and dual smokers: A pilot study	Pilot study with in vitro evaluation only of saliva or gingival crevicular fluid (no cells or teeth)
<b>Zhou et al. 2020</b>	Voltage and e-liquid composition affect nicotine deposition within the oral cavity and carbonyl formation	Wrong population and outcome: human oral trachea cast
<b>Pozuelo et al. 2022</b>	Transcriptomic Evidence That Switching from Tobacco to Electronic Cigarettes Does Not Reverse Damage to the Respiratory Epithelium	Wrong population and outcome: human Respiratory Epithelium
<b>Ying et al. 2022</b>	Saliva and Lung Microbiome Associations with Electronic Cigarette Use and Smoking	Wrong population and outcome: human lungs bacterial load

<b>Conte et al. 2022</b>	Repeatability of dental shade by digital spectrophotometry in current, former, and never smokers	Wrong population: only cigarette smokers
<b>Oya et al. 2022</b>	Smoking Status and Risk Awareness of Heated Tobacco Product Use among General Dental Practitioners Belonging to the Aichi Dental Association, Japan	Wrong outcome: awareness
<b>Abdul et al. 2020</b>	Awareness of the effects of shisha and electronic Cigarette smoking on oral health in saudi Population	Wrong outcome: awareness

## S1c) Risk of bias assessment – Observational studies (n=31)

Study	Bias due to confounding	Bias in selection of participants into the study	Bias in classification of interventions	Bias due to deviations from intended interventions	Bias due to missing data	Bias in measurement of outcomes	Bias in selection of the reported result	Overall Bias
Akinkugbe et al., 2019	Low	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Alade et al., 2022	Low	Moderate	Low	Moderate	Moderate	Moderate	Low	Moderate
AlAlali et al. 2018	Low	Low	Low	Moderate	Moderate	Moderate	Low	Moderate
Alazmi et al., 2021	Moderate	Moderate	Low	Moderate	Moderate	Moderate	Moderate	Moderate
Alhajj et al., 2022	Moderate	Moderate	Low	Moderate	Moderate	Moderate	Moderate	Moderate
Ali et al., 2022	Moderate	Moderate	Low	Moderate	Moderate	Moderate	Moderate	Moderate
AlQahtani et al. 2018	Low	Low	Low	Moderate	Moderate	Moderate	Moderate	Moderate
AlQahtani et al. 2019	Low	Low	Low	Low	Low	Moderate	Low	Moderate
Alqahtani et al., 2022	Low	Low	Low	Moderate	Moderate	Moderate	Moderate	Moderate
Alqobaly et al., 2022	Low	Low	Low	Low	Low	Moderate	Low	Moderate
ArRejaie et al. 2019	Low	Low	Low	Low	Moderate	Moderate	Low	Moderate
Ategwu et al., 2019	Low	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Bardellini et al. 2018	Low	Moderate	Low	Moderate	Moderate	Moderate	Low	Moderate
Binshabaib et al. 2019	Low	Low	Low	Moderate	Moderate	Moderate	Low	Low
Dalmyple et al., 2022	Low	Moderate	Low	Moderate	Moderate	Moderate	Low	Moderate
Ghazali et al. 2019	Low	Moderate	Low	Low	Low	Moderate	Low	Moderate
Herdon et al., 2022	Low	Moderate	Low	Moderate	Moderate	Moderate	Low	Moderate
Ho Cho et al., 2017	Low	Moderate	Low	Moderate	Moderate	Moderate	Low	Moderate

Huigol et al., 2019	Low	Moderate	Low	Moderate	Low	Moderate	Low	Moderate
Ibraheem et al. 2020	Low	Moderate	Low	Moderate	Moderate	Moderate	Low	Moderate
Irusa et al., 2022	Low	Moderate	Low	Low	Low	Moderate	Low	Moderate
Javed et al., 2017	Low	Low	Low	Low	Low	Moderate	Low	Low
Jeong et al. 2020	Low	Low	Moderate	Low	Moderate	Moderate	Moderate	Low
Kaan et al., 2018	Moderate	Moderate	Low	Moderate	Moderate	Moderate	Low	Moderate
Karaaslan et al.2020	Low	Moderate	Low	Low	Low	Moderate	Low	Moderate
Mokeem et al. 2018	Low	Low	Low	Moderate	Moderate	Moderate	Low	Low
Tatullo et al., 2016	Moderate	Moderate	Low	Moderate	Moderate	Moderate	Low	Moderate
Vemulapalli et al., 2021	Low	Moderate	Low	Moderate	Moderate	Moderate	Low	Moderate
Vhora et al., 2019	Low	Moderate	Low	Moderate	Moderate	Moderate	Low	Moderate
Vora et al., 2018	Low	Moderate	Low	Moderate	Moderate	Moderate	Low	Moderate
Yoshioka et al, 2022	Low	Low	Moderate	Low	Moderate	Moderate	Moderate	Low

## S1d) Risk of bias assessment – Interventional studies (N=12)

### a) Non-RTC

### b) RTC

Study	Randomisation process	Deviations from the intended interventions	Missing outcome data	Measurement of the outcome	Selection of the reported result	Overall
Al Deeb et al. 2020	Low Risk	Low Risk	Some Concerns	Low Risk	Some Concerns	Some Concerns
AlRifaiy et al. 2018	Low Risk	Low Risk	Some Concerns	Low Risk	Some Concerns	Some Concerns
Alshibani et al. 2022	Low Risk	Low Risk	Some Concerns	Low Risk	Some Concerns	Some Concerns
Pouly et al. 2022	Low Risk	Low Risk	Low Risk	Some Concerns	Some Concerns	Some Concerns

Study	Bias due to confounding	Bias in selection of participants into the study	Bias in classification of interventions	Bias due to deviations from intended interventions	Bias due to missing data	Bias in measurement of outcomes	Bias in selection of the reported result	Overall Bias
Akram et al., 2021	Low	Moderate	Low	Low	Low	Moderate	Moderate	Moderate
Al Hamoudi et al. 2020	Moderate	Low	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Al Harti et al. 2019	Moderate	Low	Low	Moderate	Moderate	Moderate	Low	Moderate
Alhumaidan et al. 2022	Moderate	Moderate	Low	Moderate	Moderate	Moderate	Low	Moderate
Aljasser et al. 2021	Low	Moderate	Low	Low	Low	Moderate	Moderate	Moderate
Reuther et al. 2016	Moderate	Moderate	Low	Moderate	Moderate	Moderate	Low	Moderate
Wadia et al. 2016	Low	Moderate	Low	Low	Low	Moderate	Moderate	Moderate
Xu et al. 2021	Moderate	Low	Low	Moderate	Low	Moderate	Low	Moderate



### S1 e) Risk of bias assessment – Laboratory studies (N=41)

[illegible]

## S1 f)PRISMA check-list

Section and Topic	Item #	Checklist item	Location where item is reported
<b>TITLE</b>			
Title	1	Identify the report as a systematic review.	Page 1
<b>ABSTRACT</b>			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	Page 1
<b>INTRODUCTION</b>			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	Page 2
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	Page 2
<b>METHODS</b>			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	Paragraph (par) 2.4-5
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	Par 2.6
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	Supplementary file
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	Par 2.7-8
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	Par 2.9
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	Par 2.10
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	Par 2.10
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	Par 2.11

Section and Topic	Item #	Checklist item	Location where item is reported
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	Par 2. 10-16
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	Par 2. 10-16
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	Par 2. 10-16
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	Par 2. 10-16
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	Par 2. 10-16
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	Par 2. 10-16
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	Par 2. 10-16
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	Par 2. 11
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	Par 2. 10-16
<b>RESULTS</b>			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	Par 3.1
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	Par 3.1
Study characteristics	17	Cite each included study and present its characteristics.	Par 3
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	Supplementary file
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	Table 1, 2, 3 Supplementary file

Section and Topic	Item #	Checklist item	Location where item is reported
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	Table 1, 2, 3 Supplementary file
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	Par 3 sub meta analysis
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	Par 3 sub meta analysis
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	Par 3 sub meta analysis
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	Par 3 sub bias
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	Par 3 sub meta analysis
<b>DISCUSSION</b>			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	Page 10
	23b	Discuss any limitations of the evidence included in the review.	Page 10
	23c	Discuss any limitations of the review processes used.	Page 10
	23d	Discuss implications of the results for practice, policy, and future research.	Page 10
<b>OTHER INFORMATION</b>			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	Par 2.1
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	-
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	-
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	None
Competing interests	26	Declare any competing interests of review authors.	None

Section and Topic	Item #	Checklist item	Location where item is reported
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	Supplementary file