Title: Periodontal health and chronic obstructive pulmonary disease (COPD) exacerbations: A systematic review

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Supp Table 1: Search Strategy

#	Searches	Results
1	copd.mp. [mp=ti, ab, tx, ct, sh, ot, hw, nm, fx, kf, ox, px, rx, an, ui, sy]	105350
2	chronic obstructive pulmonary disease.mp. [mp=ti, ab, tx, ct, sh, ot, hw, nm, fx, kf, ox, px, rx, an, ui, sy]	136063
3	1 or 2	171673
4	exacerbation.mp. [mp=ti, ab, tx, ct, sh, ot, hw, nm, fx, kf, ox, px, rx, an, ui, sy]	131533
5	oral bacteria.mp. [mp=ti, ab, tx, ct, sh, ot, hw, nm, fx, kf, ox, px, rx, an, ui, sy]	6438
6	oral health.mp. [mp=ti, ab, tx, ct, sh, ot, hw, nm, fx, kf, ox, px, rx, an, ui, sy]	55224
7	oral hygiene.mp. [mp=ti, ab, tx, ct, sh, ot, hw, nm, fx, kf, ox, px, rx, an, ui, sy]	44012
8	periodontal disease.mp. [mp=ti, ab, tx, ct, sh, ot, hw, nm, fx, kf, ox, px, rx, an, ui, sy]	41992
9	periodontitis.mp. [mp=ti, ab, tx, ct, sh, ot, hw, nm, fx, kf, ox, px, rx, an, ui, sy]	62141
10	gingivitis.mp. [mp=ti, ab, tx, ct, sh, ot, hw, nm, fx, kf, ox, px, rx, an, ui, sy]	24508
11	gingival bleeding.mp. [mp=ti, ab, tx, ct, sh, ot, hw, nm, fx, kf, ox, px, rx, an, ui, sy]	5887
12	porphyromonas gingivalis.mp. [mp=ti, ab, tx, ct, sh, ot, hw, nm, fx, kf, ox, px, rx, an, ui, sy]	16281
13	5 or 6 or 7	90721
14	8 or 9 or 10 or 11 or 12	103310
15	3 and 4	23887
16	14 and 15	170
17	13 and 15	155
18	hospitalisations.mp. [mp=ti, ab, tx, ct, sh, ot, hw, nm, fx, kf, ox, px, rx, an, ui, sy]	14397
19	hospitalizations.mp. [mp=ti, ab, tx, ct, sh, ot, hw, nm, fx, kf, ox, px, rx, an, ui, sy]	134158
20	18 or 19	148111
21	quality of life.mp. [mp=ti, ab, tx, ct, sh, ot, hw, nm, fx, kf, ox, px, rx, an, ui, sy]	816041
22	oral health related quality of life.mp. [mp=ti, ab, tx, ct, sh, ot, hw, nm, fx, kf, ox, px, rx, an, ui, sy]	4427
23	OHRQoL.mp. [mp=ti, ab, tx, ct, sh, ot, hw, nm, fx, kf, ox, px, rx, an, ui, sy]	2375
24	21 or 22 or 23	816057
25	cost.mp. [mp=ti, ab, tx, ct, sh, ot, hw, nm, fx, kf, ox, px, rx, an, ui, sy]	1384775
26	expense.mp. [mp=ti, ab, tx, ct, sh, ot, hw, nm, fx, kf, ox, px, rx, an, ui, sy]	147258
27	25 or 26	1481063
28	5 or 6 or 7 or 8 or 9 or 10 or 11 or 12	167812
29	3 and 4 and 20 and 28	77
30	3 and 4 and 24 and 28	118
31	3 and 4 and 27 and 28	112

Supp Table 2: excluded studies and reasons for exclusion

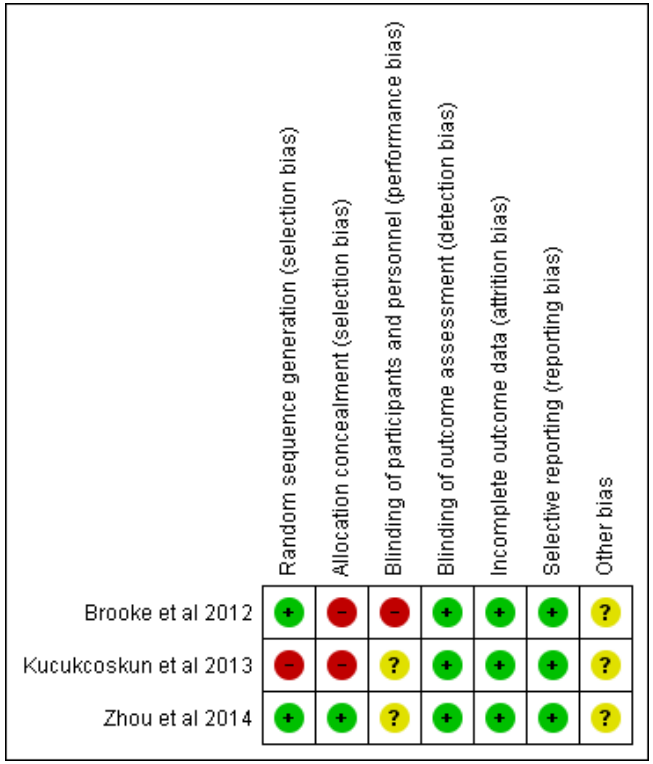
Reason for exclusion	Number of Articles	Study
Review Articles	19	Mojon 2002 [1] Dorfer *et al* 2017 [2] Muthu et al 2016 [3] Scannapieco *et al* 2003 [4] Scannapieco *et al* 1999 [5] Moghadam *et al* 2017 [6] Sabharwal et al 2018 [7] Usher *et al* 2013 [8] Prasanna *et al* 2011 [9] Scannapieco *et al* 2016 [10] Linden *et al* 2013 [11] Azarpazhooh *et al* 2006 [12] Hobbins *et al* 2017 [13] Coulthwaite *et al* 2007 [14] Whisenhunt *et al* 2017 [15] Bozejac *et al* 2017 [16] Devlin *et al* 2014 [17] Tan *et al* 2016 [18] Shi et al 2018 [19]
Outcome Relevance: • Frequency of exacerbations not assessed • Oral health parameters not assessed.	15	Raj *et al* 2014 [20] Henke *et al* 2016 [21] Bhavsar *et al* 2015 [22] Wang *et al* 2009 [23] Brooke *et al* 2012 [24] Chung *et al* 2016 [25] Sharma *et al* 2011 [26] Gaeckle *et al* 2018 [27] Tan et al 2019 [28] Pragman et al 2019 [29] Shen *et al* 2016 [30] Prasad *et al* 2020 [31] Saltnes et al 2015 [32] Bergstrom et al 2013 [33] Przybyłowska *et al* 2015 [34]
Full Text Unavailable	3	Pinto *et al* 2016 [35] Santos *et al* 2017[36] Zhou *et al* 2019 [37]

	Case-control studies				**Cross-sectional studies**			
Quality assessment criteria	Acceptable (*)	AbdelHalim *et al.* (2019)	Baldomero *et al.* (2019)	Liu et *al.* (2012)	**Adapted quality assessment criteria**	*Acceptable (*)*	Zhou *et al.* (2011)	Barros *et al.* (2013)
Selection: Case definition adequate?	*All included subjects diagnosed with COPD standard criteria*	*	*	*	***Selection**:* Representativeness of sample:	*Sample representative of the population*	*	*
Representativeness of exposed cohort?	*Random sample recruited in a defined setting*	*	*	*	Sample Size:	*Sample justified and satisfactory*	*	*
Selection of the non-exposed cohort?	*Controls derived from same population as the cases*	-	*	*	Non-respondents	*Satisfactory response rate*	-	-
Definition of control	*Controls no history of COPD or exacerbations within defined period*	-	*	*	Ascertainment of the exposure (risk factor).	*Periodontal parameters measured satisfactorily*	**	**
Comparability: Comparability of cases and controls on the basis of design and analysis	*Controls for the most important factor (smoking)*	_	_	*	***Comparability:*** The subjects in different outcome groups are comparable, based on the study design or analysis. Confounding factors are controlled.	*Controls for the most important factor (smoking)*	*	*
	Control for additional factors	-	*	*		The study controls for any additional factors	*	*
Exposure: Ascertainment of exposure?	*Oral health assessment carried out for all cases (clinical/self-reported)*	*	*	*	***Outcome:*** Assessment of the outcome	Hospitalisations QOL assessed appropriately	*	*
Same methods of ascertainment for cases and controls	*Same assessment methods used*	-	*	*	Statistical testing	Appropriate statistical analysis	*	*
Response rate	*Described for participants*	-	*	*				
Overall quality Score		**3**	**8**	**9**			**8**	**8**

Supplementary Table 3. Quality assessment of observational studies using Newcastle Ottawa Scale Case-control studies and adapted for Cross-sectional Studies). The domains covered by the scale included selection, comparability, outcomes, and exposure. Each asterisk represents whether the individual criterion within the subsection was fulfilled. A maximum of 9 can be assigned for each study using the Newcastle Ottawa Scale. A maximum score of 10 can be assigned for the adapted Newcastle Ottawa Scale.

Scale threshold: Good quality: 3 or 4 stars in selection domain AND 1 or 2 stars in comparability domain AND 2 or 3 stars in outcome/exposure domain. **Fair quality:** 2 stars in selection domain AND 1 or 2 stars in comparability domain AND 2 or 3 stars in outcome/exposure domain. **Poor quality:** 0 or 1 star in selection domain OR 0 stars in comparability domain OR 0 or 1 stars in outcome/exposure domain.

Supp Figure 1: Quality assessment of intervention studies using Cochrane risk of bias assessment tool



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The PRISMA Check list

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	Title page
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	01-02
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	03-05
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	05
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	05
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	06
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	05
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	05-06

Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	06-07
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	07-08
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	08
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	07
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	08
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	NA

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	07
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	NA
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	Fig1 9-10
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	9-10
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	9-10
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	9-10
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	NA
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	9-10

Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	NA
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	11-12
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	13
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	13-14
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	NA

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

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