Bronchiectasis as a Comorbidity of Chronic Obstructive Pulmonary Disease

A Systematic Review and Meta-analysis

Qingxia Du, Jianmin Jin, Xiaofang Liu, Yongchang Sun

Table A. The Quality of Observational Studies Assessed by Newcastle – Ottawa Scale

| Study               | Year | Selection | Comparability | Outcome | Total stars |
|---------------------|------|-----------|---------------|---------|-------------|
| Gompertz S 13       | 2001 | B(*)      | A(*)          | A(*)    | NO          | A(*) | A(*) | A(*) | 8 |
| Katsura H 14        | 2001 | -         | -             | -       | -           | -    | -    | -    | - |
| Pate I S. 15        | 2004 | NO        | A(*)          | A(*)    | A(*)        | B(*) | A(*) | A(*) | A(*) | 8 |
| Roche N 16          | 2006 | B(*)      | A(*)          | A(*)    | A(*)        | B(*) | A(*) | A(*) | A(*) | 9 |
| García-Vidal C 17   | 2009 | B(*)      | A(*)          | A(*)    | A(*)        | B(*) | A(*) | A(*) | A(*) | 9 |
| Bafadhel M 18       | 2011 | B(*)      | A(*)          | A(*)    | A(*)        | A(*) | NO   | A(*) | A(*) | 8 |
| Martínez-García MA 19 | 2011 | B(*)      | A(*)          | A(*)    | A(*)        | B(*) | A(*) | A(*) | A(*) | 9 |
| Eman O. Arram 20    | 2012 | B(*)      | A(*)          | A(*)    | A(*)        | A(*) | A(*) | B(*) | A(*) | 8 |
| Martínez-García MA 21 | 2013 | B(*)      | A(*)          | A(*)    | A(*)        | B(*) | A(*) | A(*) | NO  | 8 |
| Tulek B 22          | 2013 | B(*)      | A(*)          | A(*)    | A(*)        | A(*) | NO   | A(*) | A(*) | 8 |
| Timothy Gatheral 23 | 2014 | B(*)      | A(*)          | A(*)    | A(*)        | B(*) | A(*) | A(*) | A(*) | 9 |
| Gallego M 24        | 2014 | B(*)      | A(*)          | A(*)    | A(*)        | B(*) | A(*) | A(*) | A(*) | 9 |

Table B. The list of 48 full-text excluded articles.

| No | Title                                                                                                                                                                                                 | Exclusion reasons   |
|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| 1  | Siafakas N M, Vermeire P, Pride N B, et al. Optimal assessment and management of chronic obstructive pulmonary disease (COPD)[J]. European Respiratory Journal, 1995, 8(8): 1398-1420. | Review              |
| 2  | Keistinen T, Saynajakangas O, Tuuponen T, et al. Bronchiectasis: an orphan disease with a poorly-understood prognosis[J]. European Respiratory Journal, 1997, 10(12): 2784-2787. | Review              |
| 3  | Jones A P, Rowe B H. Bronchopulmonary hygiene physical therapy for chronic obstructive pulmonary disease and bronchiectasis[J]. The Cochrane Library, 1998.                                                                 | Review              |
| 4  | O'Brien C, Guest PJ, Hill SL, Stockley RA. Physiological and radiological characterisation of patients diagnosed with chronic obstructive pulmonary disease in primary care. Thorax. 2000;55(8):635–642. | cross-sectional study |
|   | Reference                                                                 | Type       |
|---|--------------------------------------------------------------------------|------------|
| 5 | Jones A, Rowe B H. Bronchopulmonary hygiene physical therapy in bronchiectasis and chronic obstructive pulmonary disease: a systematic review[J]. Heart & Lung: The Journal of Acute and Critical Care, 2000, 29(2): 125-135. | Review     |
| 6 | Gompertz S, Bayley D L, Hill S L, et al. Relationship between airway inflammation and the frequency of exacerbations in patients with smoking related COPD. Thorax. 2001; 56:36–41 | Did not have control |
| 7 | Wilkinson T M, Patel I S, Wilks M, et al. Airway bacterial load and FEV1 decline in patients with chronic obstructive pulmonary disease.[J]. American Journal of Respiratory & Critical Care Medicine, 2003, 167(8):1090-1095. | No outcomes of interest |
| 8 | Altin R, Savranlar A, Kart L, et al. Presence and HRCT quantification of bronchiectasis in coal workers[J]. European Journal of Radiology, 2004, 52(2):157-163. | Occupational subjects |
| 9 | Antoni R, Eduard M, Néstor S, et al. Microbiologic determinants of exacerbation in chronic obstructive pulmonary disease.[J]. Archives of Internal Medicine, 2005, 165(8):891-897. | No outcomes of interest |
| 10 | Gursel G. Determinants of the length of mechanical ventilation in patients with COPD in the intensive care unit[J]. Respiration, 2005, 72(1): 61-67. | No outcomes of interest |
| 11 | Hoffman E A, Simon B A, Geoffrey M L. State of the Art. A structural and functional assessment of the lung via multidetector-row computed tomography: phenotyping chronic obstructive pulmonary disease.[J]. Proceedings of the American Thoracic Society, 2006, 3(6):519-32. | Review     |
| 12 | Fujimoto K, Kitaguchi Y, Kubo K, Honda T. Clinical analysis of chronic obstructive pulmonary disease phenotypes classified using high-resolution computed tomography. Respirology. 2006;11(6):731–740. | No outcomes of interest |
| 13 | Gursel G. Does coexistence with bronchiectasis influence intensive care unit outcome in patients with chronic obstructive pulmonary disease?[J]. Heart & Lung the Journal of Critical Care, 2006, 35(1):58-65. | cross-sectional study/bronchiectasis was confirmed by Chest X-ray |
| 14 | Martínez-García M A, Perpiñá-Tordera M, Soler-Cataluña J J, et al. Dissociation of lung function, dyspnea ratings and pulmonary extension in bronchiectasis.[J]. Respiratory Medicine, 2007, 101(11):2248–2253. | Review     |
| 15 | Wedzicha J A, Hurst J R. Structural and functional co-conspirators in chronic obstructive pulmonary disease exacerbations.[J]. Proceedings of the American Thoracic Society, 2007, 4(8):602-605. | Review     |
|   | Title                                                                 | Journal/Conference Details                                                                 | Outcome of Interest     |
|---|----------------------------------------------------------------------|---------------------------------------------------------------------------------------------|-------------------------|
| 16| Ley-Zaporozhan J, Ley S, Kauczor H U. Morphological and functional imaging in COPD with CT and MRI: present and future. | European Radiology, 2008, 18(3):510-521.                                                    | Review                  |
| 17| Chang A, Bilton D. Exacerbations in cystic fibrosis: 4--Non-cystic fibrosis bronchiectasis. | Thorax, 2008, 63(3):269-276.                                                               | No outcomes of interest |
| 18| Chang A B, Grimwood K, Maguire G, et al. Management of bronchiectasis and chronic supplicative lung disease in indigenous children and adults from rural and remote Australian communities | The Medical journal of Australia, 2008, 189(7):386-93.                                       | No outcomes of interest |
| 19| Han MK, Bartholmai B, Liu LX, et al. Clinical significance of radiologic characterizations in COPD. | COPD. 2009;6(6):459–467.                                                                   | No outcomes of interest |
| 20| Kim W, Oh Y J, Lee Y, et al. CT scanning-based phenotypes vary with ADRB2 polymorphisms in chronic obstructive pulmonary disease. | Respiratory Medicine, 2009, 103(1):98-103.                                                   | No outcomes of interest |
| 21| Moncelly L, Maurer C, Roche N, et al. [Acute COPD exacerbations in women: EABPCO-CPHG study by the College of general hospital pneumologists]. | Revue De Pneumologie Clinique, 2010, 66(2):107-19.                                         | Single sex subjects     |
| 22| Agusti A. Prognosis of COPD patients requiring frequent hospitalization: role of airway infection. | Respiratory Medicine, 2010, 104(6):840–848.                                                 | Review                  |
| 23| Agusti A, Calverley P, Celli B, Coxson HO, Edwards LD, Lomas D, MacNee W, Miller BE, Rennard S, Silverman EK, Tal-Singer R, Wouters E, Yates JC, Vestbo J. Characterisation of COPD heterogeneity in the ECLIPSE cohort. | Respir Res. 2010;11:122.                                                                   | cross-sectional study   |
| 24| Mair G, Maclay J, Miller J J, et al. Airway dimensions in COPD: relationships with clinical variables. | Respir Med, 2010, 104(11):1683–1690.                                                      | Do not have control     |
| 25| Valderrey A D, Pozuelo M J, Jiménez P A, et al. Chronic colonization by Pseudomonas aeruginosa of patients with obstructive lung diseases: cystic fibrosis, bronchiectasis, and chronic obstructive pulmonary disease. | Diagnostic Microbiology & Infectious Disease, 2010, 68(1):20–27.                           | No outcomes of interest |
| 26| Finklea J D, Khan G, Thomas S, et al. Predictors of mortality in hospitalized patients with acute exacerbation of bronchiectasis. | Respiratory Medicine, 2010, 104(6):816–821.                                                 | Review                  |
| 27| Kurahara M, Kokuho N, Hayashi H, et al. Clinical characteristics of COPD with mild bronchiectasis. | European Respiratory Journal, 2011(Suppl 55):3571.                                           | No outcomes of interest |
| 28 | O'Donnell A E. Bronchiectasis in patients with COPD: a distinct COPD phenotype?[J]. CHEST Journal, 2011, 140(5): 1107-1108. | editorial |
| 29 | Shimizu K, Hasegawa M, Makita H, et al. Comparison of airway remodelling assessed by computed tomography in asthma and COPD.[J]. Respiratory Medicine, 2011, 105(9):1275–1283. | No outcomes of interest |
| 30 | Van T N, Wada H, Ogawa E, et al. Recent findings in chronic obstructive pulmonary disease by using quantitative computed tomography.[J]. Respiratory Investigation, 2012, 50(3):78-87. | Review |
| 31 | Spyratos D ,, Chloros D ,, Sichletidis L ,. Diagnosis of chronic obstructive pulmonary disease in the primary care setting.[J]. Hippokratia, 2012, 16(1):17-22. | Review |
| 32 | Lode H, Allewelt M, Balk S, et al. A prediction model for bacterial etiology in acute exacerbations of COPD.[J]. Infection, 2007, 35(3):143-149. | Did not have control |
| 33 | Novosad S A, Barker A F. Chronic obstructive pulmonary disease and bronchiectasis.[J]. Current Opinion in Pulmonary Medicine, 2013, 19(2):133-139. | Review |
| 34 | Roca M, Verduri A, Corbetta L, et al. Mechanisms of acute exacerbation of respiratory symptoms in chronic obstructive pulmonary disease[J]. European Journal of Clinical Investigation, 2013, 43(5):510-521. | Review |
| 35 | Gon calvesa JR, Pereirab MC, De Cerqueiraa EP, et al. Severe obstructive disease: Similarities and differences between smoker and nonsmoker patients with Does coexistence with bronchiectasis influence intensive care unit outcome in patients with chronic obstructive pulmonary disease. Rev Port Pneumol.2013;19(1):13–18. | No outcomes of interest |
| 36 | J, Rezende Gon?alves, M, Corso Pereira, D, Oliveira Magro, et al. Severe obstructive disease: Similarities and differences between smoker and non-smoker patients with COPD and/or bronchiectasis[J]. Revista Portuguesa De Pneumologia, 2013, 19(1):13–18. | Review |
| 37 | Lima A J, Tambascio J, Hc D D S, et al. Transport of mucoid mucus in healthy individuals and patients with chronic obstructive pulmonary disease and bronchiectasis.[J]. Revista Portuguesa De Pneumologia, 2013, 19(5):211-216. | Review |
| 38 | Birch J, Johnson G, Jiwa K, et al. S65 Large and small airway epithelial cell senescence present in COPD and bronchiectasis?[J]. Thorax, 2013, 68(Suppl 3):A35-A36. | No outcomes of interest |
| 39 | Anwar G A, Nnell M J, Worthy S A, et al. Phenotyping adults with non-cystic fibrosis bronchiectasis: a prospective observational cohort study.[J]. Respiratory Medicine, 2013, | No outcomes of interest |
| Page | Title                                                                 | Authors                                                                                      | Summary                                                                                     |
|------|----------------------------------------------------------------------|--------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| 40   | Large and small airway epithelial cell senescence present in COPD and bronchiectasis? | Birch J, Johnson G, Jiwa K, et al.                                                          | No outcomes of interest                                                                      |
| 41   | Comorbid pulmonary disease and risk of community-acquired pneumonia in COPD patients. | S-H L, B-C J, Y-M S, et al.                                                                  | bronchiectasis was confirmed by Chest X-ray                                                  |
| 42   | COPD-bronchiectasis overlap syndrome.                                  | Hurst JR, Elborn JS, De Soyza A.                                                              | comment                                                                                     |
| 43   | Previous outpatient antibiotic use in patients admitted to hospital for COPD exacerbations: room for improvement | Miravitlles M, Soler-Cataluña J J, Baranda F, et al.                                          | No outcomes of interest                                                                      |
| 44   | Antibiotics For Treatment And Prevention Of Exacerbations Of Chronic Obstructive Pulmonary Disease. | Robert W, Sanjay S, Antonio A, et al.                                                        | Review                                                                                      |
| 45   | Chronic obstructive pulmonary disease: lobe-based visual assessment of volumetric CT by Using standard images--comparison with quantitative CT and pulmonary function test in the COPDGene study. | Soo K S, Joon Beom S, Ho Yun L, et al.                                                        | Did not have control                                                                        |
| 46   | Evaluation and reproducibility in COPD subjects with and without bronchiectasis. | Ma W, Sheikh K, Svenningsen S, et al.                                                        | No outcomes of interest                                                                      |
| 47   | Bronchiectasis Phenotype in COPD Patients.                            | Martínez-Garcia M Á, Selma-Ferrer M J, Soriano C N, et al.                                   | Review                                                                                      |
| 48   | Clinical characteristics of patients with chronic obstructive pulmonary disease with comorbid bronchiectasis: a systemic review and meta-analysis. | Ni Y, Shi G, Yu Y, et al.                                                                    | Review                                                                                      |
Fig A. Funnel plots of publication bias for comorbid bronchiectasis and risk for COPD exacerbations. Left side without trim and fill and right with.

Fig B. Funnel plots of publication bias for comorbid bronchiectasis and risk for isolation of PPMs and P. Aeruginosa.

Fig C. Funnel plots without and with trim and fill assessing symmetry of effect estimates for
**severe obstruction.** Left side without trim and fill and right with.

**Fig D** Funnel plots of publication bias for comorbid bronchiectasis and risk for mortality.

Left side without trim and fill and right with.

**Appendix 1. Commands for each figure**

Figure 2, 3, 4, 5.

Stata 12.0 Software
. gen lnrr=ln(rr)
. gen lnll=ln(ll)
. gen lnul=ln(ul)
metan lnrr lnll lnul, eform label (namevar=author,yearvar=year) boxsca(0.9)random

Figure A, B, C, D.

Stata12.0 Software
. gen lnrr=ln(rr)
. gen lnll=ln(ll)
. gen lnul=ln(ul)
gen selnrr=(lnul-lnll)/3.92
metabias lnrr selnrr, graph(begg)
metatrim rr ll ul, ci reffect eform funnel