Bronchiectasis and COPD Overlap Syndrome

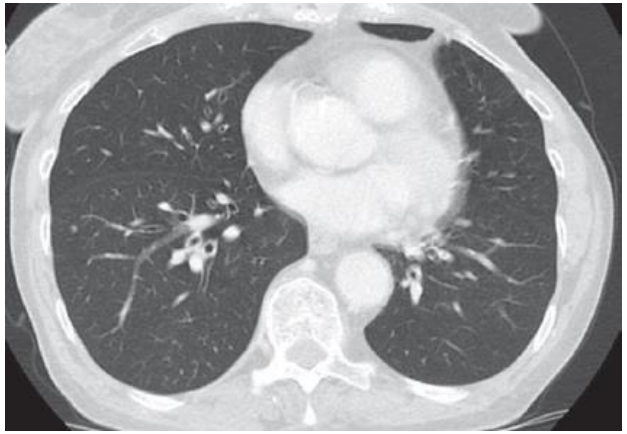
Ji Ye Jung

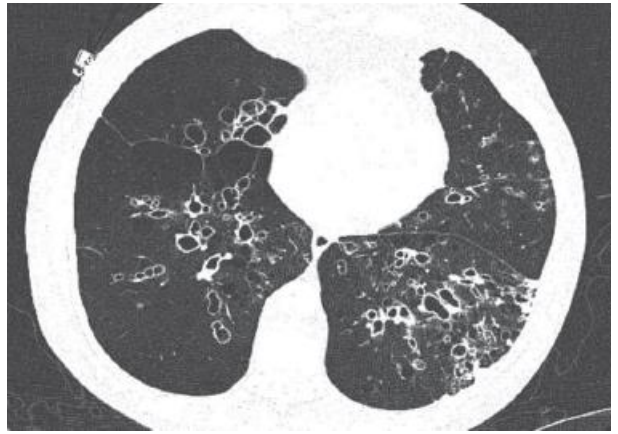
Division of Pulmonary and Critical Care Medicine, Department of Internal Medicine,

Severance Hospital, Yonsei University College of Medicine

삼가 고인의 명복을 빕니다.
편히 쉬세요. 당신의 헌신과 열정 잊지 않겠습니다.

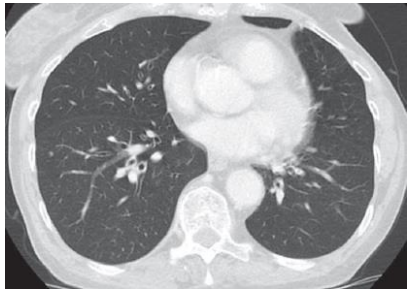
Definition and Diagnosis

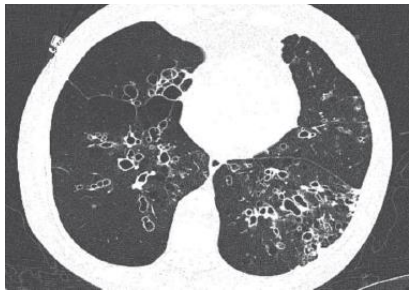


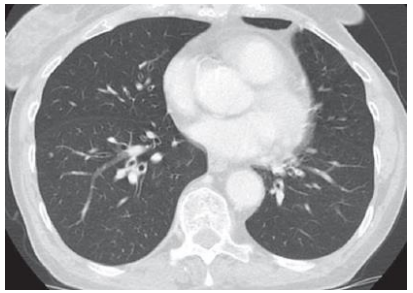


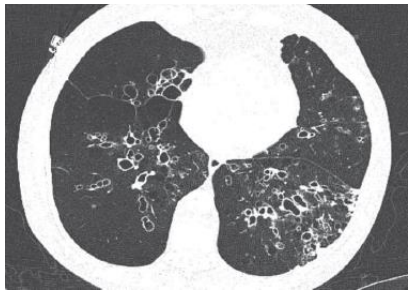
	COPD	Bronchiectasis
Symptom	cough, sputum, dyspnea	
Types of diagnosis	Physiologic diagnosis	Structural diagnosis
Airway wall change	Mild and diffuse	-Localized /diffuse depending on the etiology -Mild or more severe (varicose/cystic change)

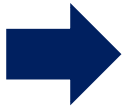
Mechanism underlying two diseases

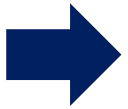


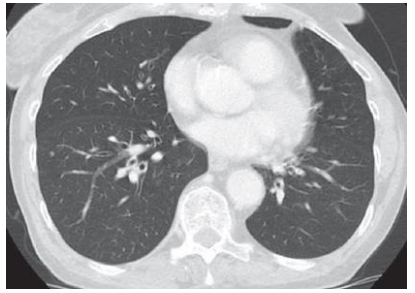


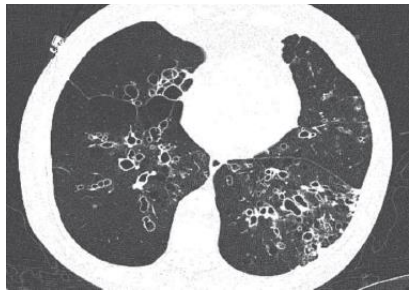


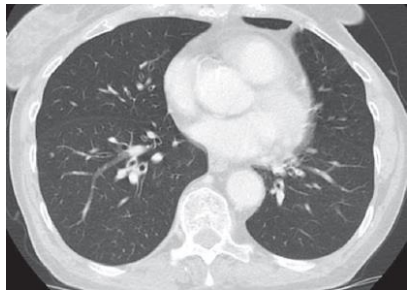


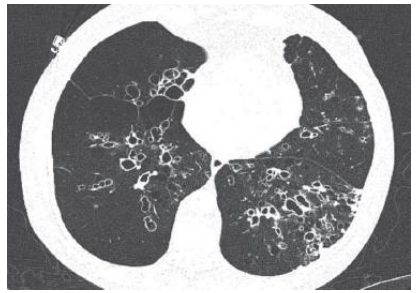












+ Bronchiectasis

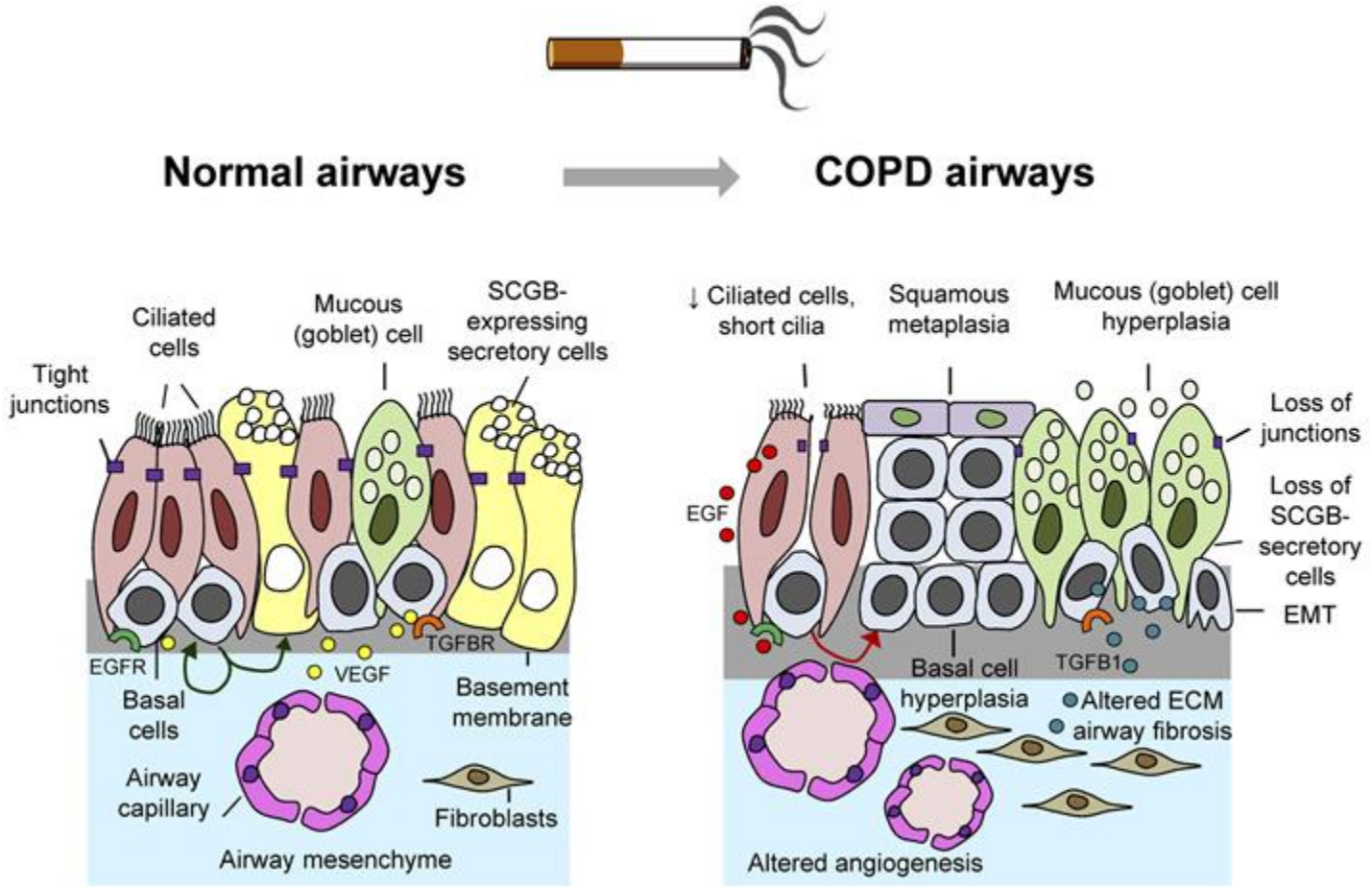
+ COPD

Early Events in the Pathogenesis of Chronic Obstructive Pulmonary Disease

Smoking-induced Reprogramming of Airway Epithelial Basal Progenitor Cells

Renat Shaykhiev and Ronald G. Crystal

Department of Genetic Medicine, Weill Cornell Medical College, New York, New York



Shaykhiev et al. Annals ATS 2014

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Clinical characteristics of patients with chronic obstructive pulmonary disease with comorbid bronchiectasis: a systemic review and meta-analysis

Yingmeng Ni
Guochao Shi
Youchao Yu
Jimin Hao
Tiantian Chen
Huihui Song

Department of Pulmonary Medicine, Ruijin Hospital, Shanghai Jiao Tong University School of Medicine, Shanghai, People's Republic of China

Prevalence

- 54.3% (range: 25.6%–69%)

Table 1 Characteristics of included studies

Study number	Authors	Publication year	Time frame of patients' recruitment	Severity of COPD	Parameters under study
1	Fujimoto et al[11]	2006	September 2002 to September 2004	Moderate, severe	Sex, age, smoking history, onset of symptoms, BMI, α_1-antitrypsin, eosinophil counts, daily sputum production, exacerbation rate, hospitalization rate, post-BD FEV_1/FVC, post-BD FEV_1, TLC, PaO_2, $PaCO_2$, response to β_2-agonist
2	Martínez-García et al[7]	2011	January 2004 to December 2006	Moderate, severe	Sex, age, smoking history, onset of symptoms, daily sputum production, daily treatments, dyspnea MRC, exacerbation in previous year, acute antibiotic treatments, acute oral steroid treatments, fibrinogen, albumin, CRP, α_1-antitrypsin, post-BD FEV_1/FVC, post-BD FEV_1, PPM colonization, *Pseudomonas aeruginosa* isolates, *Haemophilus influenzae* isolates
3	Bafadhel et al[1]	2011	Not mentioned	Not mentioned	Sex, age, smoking history, daily sputum production, sputum total cell count, exacerbation in previous year, BMI, SGRQ score, CRQ score, VAS score, ICS dosage, post-BD FEV_1/FVC, post-BD FEV_1
4	Martínez-García et al[13]	2013	January 2004 to February 2007	Moderate, severe	Sex, age, smoking history, onset of symptoms, daily sputum production, daily treatments, BMI, dyspnea MRC, exacerbation in previous year, acute antibiotic treatments, acute oral steroid treatments, all-cause mortality, albumin, CRP, α_1-antitrypsin, post-BD FEV_1/FVC, post-BD FEV_1, post-BD FVC, PPM colonization, *Pseudomonas aeruginosa* isolates, *Haemophilus influenzae* isolates
5	Tulek et al[12]	2013	January 2010 to May 2012	Mild, moderate, severe, very severe	Age, smoking history, onset of symptoms, daily sputum production, exacerbation in previous year, albumin, CRP, ESR, post-BD FEV_1/FVC, post-BD FE, V_1, post-BD FVC
6	Gatheral et al[4]	2014	January 1998 to September 2008	Not mentioned	Sex, age, onset of symptoms, daily sputum production, post-BD FEV_1/FVC, post-BD FEV_1, PPM colonization, *Pseudomonas aeruginosa* isolates, *Haemophilus influenzae* isolates, respiratory admissions per year, nonrespiratory admissions per year, age at death

Table 2 Radiological characteristics of COPD patients in the included studies

Study number	CT slice thickness	N (with/without bronchiectasis)	Diagnostic criteria of bronchiectasis
1	1 mm collimation at 10 mm intervals	44/39	Method of Goddard et al[23]
2	1 mm collimation at 10 mm intervals	53/39	1) Lack of tapering of bronchi, 2) dilation of bronchi when the internal diameter was larger than that of the adjacent pulmonary artery, 3) visualization of the peripheral bronchi within 1 cm of the costal pleural surface or adjacent mediastinal pleural surface
3	1 mm collimation at 10 mm intervals	33/13	1) Lack of tapering of bronchi, 2) dilation of bronchi when the internal diameter was larger than that of the adjacent pulmonary artery, 3) visualization of the peripheral bronchi within 1 cm of the costal pleural surface or adjacent mediastinal pleural surface
4	1 mm collimation at 10 mm intervals	115/86	1) Lack of tapering of bronchi, 2) dilation of bronchi when the internal diameter was larger than that of the adjacent pulmonary artery, 3) visualization of the peripheral bronchi within 1 cm of the costal pleural surface or adjacent mediastinal pleural surface
5	1 mm collimation at 10 mm intervals	27/26	Bhalla scoring system[24]
6	1 mm or 2.5 mm or 5 mm or 7 mm collimation at 10 mm intervals	278/128	1) Lack of tapering of bronchi, 2) dilation of bronchi when the internal diameter was larger than that of the adjacent pulmonary artery, 3) visualization of the peripheral bronchi within 1 cm of the costal pleural surface or adjacent mediastinal pleural surface

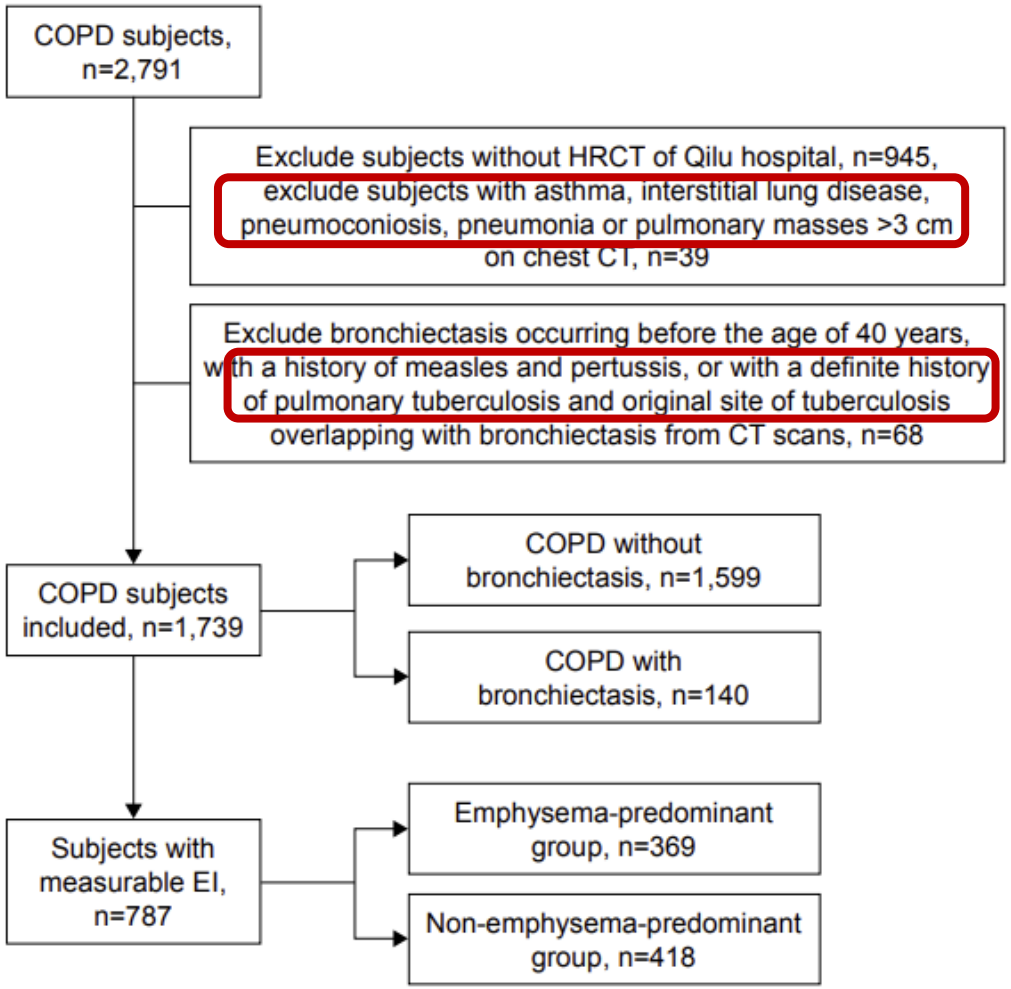
Ni et al. Int Jr COPD 2015

High prevalence of bronchiectasis in emphysema-predominant COPD patients

Prevalence

Shuang Dou[1]
Chunyan Zheng[1]
Liwei Cui[1]
Mengshuang Xie[1]
Wei Wang[1]
Hui Tian[1]
Kang Li[1]
Kaidi Liu[1]
Xinyu Tian[1]
Xin Wang[1]
Qun Zhang[1]
Xin Ai[1]
Junchao Che[1]
Qixiao Liu[1]
Haijun Li[2]
Wei Xiao[1]

[1]Department of Pulmonary Medicine, Qilu Hospital, Shandong University, Jinan, People's Republic of China; [2]Department of Cadre Health Care, Qilu Hospital, Shandong University, Jinan, People's Republic of China



retrospective study
retrieved from April 2012 to December 2015 in Qilu Hospital, Shan Dong University

The prevalence of bronchiectasis among COPD subjects was **8.1%** in the present research.

Dou et al. Int Jr COPD 2018

High prevalence of bronchiectasis in emphysema-predominant COPD patients

Prevalence

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[1]Department of Pulmonary Medicine, Qilu Hospital, Shandong University, Jinan, People's Republic of China; [2]Department of Cadre Health Care, Qilu Hospital, Shandong University, Jinan, People's Republic of China

Table 3 Comparison of characteristics between emphysema-predominant group and non-emphysema-predominant group

Characteristics	Emphysema-predominant group, n=369	Non-emphysema-predominant group, n=418	P-value
Age, years	69.9±9.1	68.2±10.2	0.014[a]
Male, n (%)	317 (85.9)	303 (72.5)	<0.001[b]
BMI, kg/m^2	22.5±4.1	24.5±3.8	<0.001[a]
Smokers, n (%)	299 (81.0)	277 (66.3)	<0.001[b]
Smoking history, pack-years	34.3±29.6	27.0±29.9	<0.001[c]
Blood tests			
ALB, g/L	37.7±4.7	39.2±4.6	<0.001[a]
WBC, 10^9/L	8.2±3.2	7.5±3.0	0.002[c]
NEU, %	71.2±14.5	67.9±14.0	0.001[a]
EOS, %	1.7±3.0	2.1±4.8	0.007[c]
ESR, mm/h	19.5±19.2	20.5±18.6	0.252[c]
Fib, g/L	3.5±1.3	3.4±1.3	0.112[c]
PFT			
FVC, L	2.3±0.7	2.6±0.9	<0.001[a]
FEV_1, L	1.0±0.5	1.6±0.7	<0.001[c]
FEV_1% predicted	38.0±17.5	56.7±19.8	<0.001[c]
FEV_1/FVC%	45.1±10.9	59.0±10.8	<0.001[c]
Comorbidity, n (%)			
Tuberculosis	39 (10.6)	29 (6.9)	0.070[b]
Ischemic heart disease	81 (22.0)	120 (28.7)	0.030[b]
Pulmonary hypertension	19 (5.1)	8 (1.9)	0.013[b]
Hypertension	105 (28.5)	147 (35.2)	0.044[b]
Cor pulmonale	109 (29.5)	46 (11.0)	<0.001[b]
Diabetes mellitus	27 (7.3)	52 (12.4)	0.017[b]
Bronchiectasis	61 (16.5)	43 (10.3)	0.010[b]
%LAA-950	24.5±12.0	4.0±2.8	<0.001[c]

Dou et al. Int Jr COPD 2018

Bronchiectasis Rheumatoid Overlap Syndrome Is an Independent Risk Factor for Mortality in Patients With Bronchiectasis

A Multicenter Cohort Study

Anthony De Soyza, MD, PhD; Melissa J. McDonnell, MD; Pieter C. Goeminne, MD, PhD; Stefano Aliberti, MD, PhD; Sara Lonni, MD; John Davison, RN; Lieven J. Dupont, MD, PhD; Thomas C. Fardon, MD; Robert M. Rutherford, MD; Adam T. Hill, MD; and James D. Chalmers, MD, PhD

TABLE 1] Details of the European BR Cohorts

Variable	Leuven (Belgium)	Galway (Ireland)	Monza (Italy)	Edinburgh (UK)	Newcastle (UK)	Dundee (UK)
Total	253 (100)	242 (100)	201 (100)	608 (100)	126 (100)	286 (100)
Demographic						
Age, median (IQR), y	68 (56-78)	63 (53-71)	68 (59-73)	67 (58-75)	61 (54-69)	68 (61-75)
Male sex	127 (50)	76 (31)	80 (39)	243 (40)	51 (41)	115 (42)
Etiology[a]						
Idiopathic	78 (31)	98 (40)	79 (39)	261 (42)	52 (41)	124 (43)
Postinfective	50 (19)	41 (17)	51 (25)	207 (34)	28 (22)	51 (17)
ABPA	15 (6)	5 (2)	4 (2)	49 (8)	8 (6)	31 (11)
BCOS	42 (17)	26 (11)	49 (24)	0[b]	15 (12)	7 (2)
Immunodeficiency	18 (7)	13 (5)	9 (4)	6 (1)	14 (11)	16 (6)
BROS	25 (10)	55 (23)	2 (1)	44 (7)	11 (9)	10 (4)
IBD	5 (2)	4 (2)	6 (3)	14 (2)	2 (1)	8 (3)
Severity markers						
Exacerbations/y	1.8 ± 2.0	3.2 ± 1.3	1.9 ± 1.9	1.7 ± 2.0	3.4 ± 1.7	2.1 ± 1.8
Previous hospital admissions	67 (26)	63 (26)	56 (27)	133 (21)	74 (58)	66 (23)
% *Pseudomonas aeruginosa*	20 (8)	35 (14)	39 (19)	70 (12)	13 (10)	37 (14)
Lobes involved on CT scanning	2.9 ± 1.3	2.7 ± 1.3	2.8 ± 1.4	3.0 ± 1.6	2.8 ± 1.4	3.2 ± 1.6
Mean FEV_1 % predicted	70.1 ± 27	77.5 ± 24	71.7 ± 35	72.6 ± 25	64.0 ± 27	72.1 ± 26
Mean BSI score	6.7 ± 4.8	7.2 ± 4.4	7.2 ± 4.5	7.3 ± 4.8	9.6 ± 4.9	7.1 ± 4.5

[b] Patients with BCOS were excluded from this cohort

Characteristics of bronchiectasis in Korea: First data from the Korean Multicentre Bronchiectasis Audit and Research Collaboration registry and comparison with other international registries

Hyun Lee[1]
Hayoung Choi[2]
James D. Chalmers[3]
Raja Dhar[4]
Tu Q. Nguyen[5]
Simone K. Visser[6]
Lucy C. Morgan[7]
Yeon-Mok Oh[8]

Prevalence

TABLE 1 Comparison of the clinical characteristics of bronchiectasis in cohorts from Korea, Australia, Europe and India

	Korea (n = 598)	Australia (n = 653)	Europe[a] (n = 2596)	India[a] (n = 2195)
Demographics				
Age, years	66 (60–72)	73 (64–79)	67 (57–74)	56 (41–66)
Men	264 (44.1)	195 (29.9)	1010 (38.9)	1249 (56.9)
BMI, kg/m^2	22.9 (20.7–25.4)	25.0 (21.5–29.0)	24.8 (21.8–28.1)	21.5 (18.5–24.5)
Current or former smokers	211 (35.3)	145 (22.2)	990 (38.1)	619 (28.2)
Comorbidities				
Ischaemic heart disease	27 (4.5)	46 (7.0)	453 (17.5)	355 (16.2)
Stroke	11 (1.8)	20 (3.1)	152 (5.9)	9 (0.4)
Diabetes mellitus	73 (12.2)	42 (6.4)	260 (10.0)	315 (14.4)
Liver disease	13 (2.2)	5 (0.8)	41 (1.6)	18 (0.8)
Chronic renal failure	12 (2.0)	12 (1.8)	154 (5.9)	26 (1.2)
COPD	226 (37.8)	95 (14.5)	431 (16.6)	512 (23.3)
Asthma	134 (22.4)	94 (14.4)	226 (8.7)	485 (22.1)
Osteoporosis	70 (11.7)	151 (23.1)	192 (7.4)	130 (5.9)
GORD	89 (14.9)	224 (34.3)	394 (15.2)	346 (15.8)
Solid tumour	50 (8.4)	14 (2.2)	164 (6.3)	17 (0.8)
Disease severity				
BSI score	6 (4–9)	9 (6–12)	6 (4–10)	7 (3–10)
BSI score risk class				
Mild	171 (29.4)	90 (17.9)	753 (29.0)	728 (33.2)
Moderate	257 (44.1)	143 (28.5)	926 (35.7)	674 (30.7)
Severe	154 (26.5)	269 (53.6)	917 (35.3)	793 (36.1)
Radiological status				
Reiff score	5 (3–9)	4 (2–9)	4 (2–6)	6 (3–9)

Lee et al. Respirology 2021

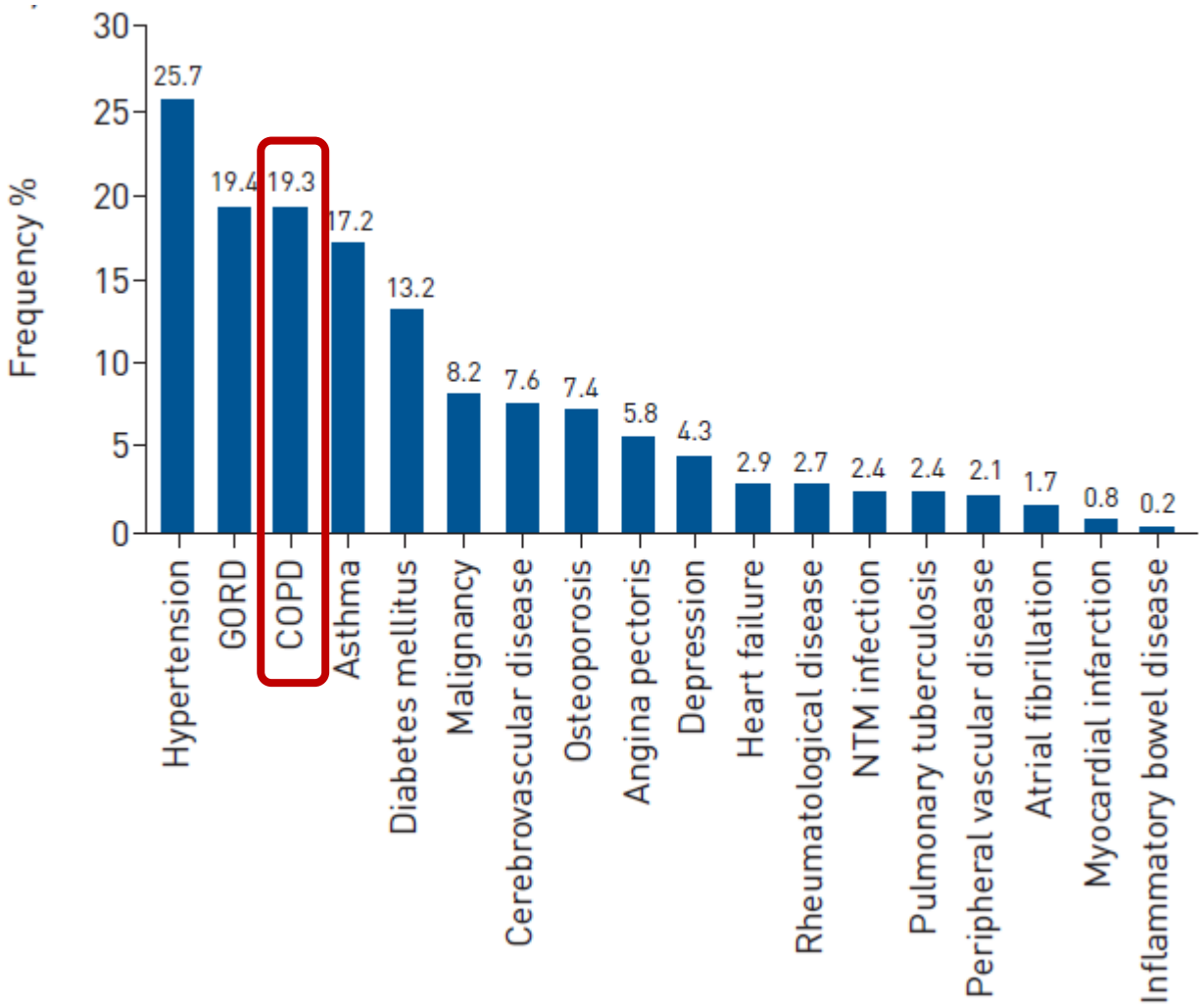
Population-based prevalence of bronchiectasis and associated comorbidities in South Korea

Prevalence

Hayoung Choi[1], Bumhee Yang[2], Hyewon Nam[3], Dae-Sung Kyoung[3], Yun Su Sim[1], Hye Yun Park[4], Jae Seung Lee[5], Sei Won Lee[5], Yeon-Mok Oh[5], Seung Won Ra[6], Sang-Heon Kim[7], Jang Won Sohn[7], Ho Joo Yoon[7] and Hyun Lee[7]

2012–2017 Health Insurance Review and Assessment Service, National Patient Sample (HIRA-NPS)

30,732 patients diagnosed with bronchiectasis



Choi et al. ERJ 2019

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Bronchiectasis as a Comorbidity of Chronic Obstructive Pulmonary Disease: A Systematic Review and Meta-Analysis

Mortality

BCO vs COPD

Qingxia Du[1], Jianmin Jin[1], Xiaofang Liu[1], Yongchang Sun[1,2]*

1 Department of Respiratory Medicine and Department of Emergency, Beijing Tongren Hospital, Capital Medical University, Beijing, 100730, China, **2** Department of Respiratory and Critical Care Medicine, Peking University Third Hospital, Beijing, 100191 China

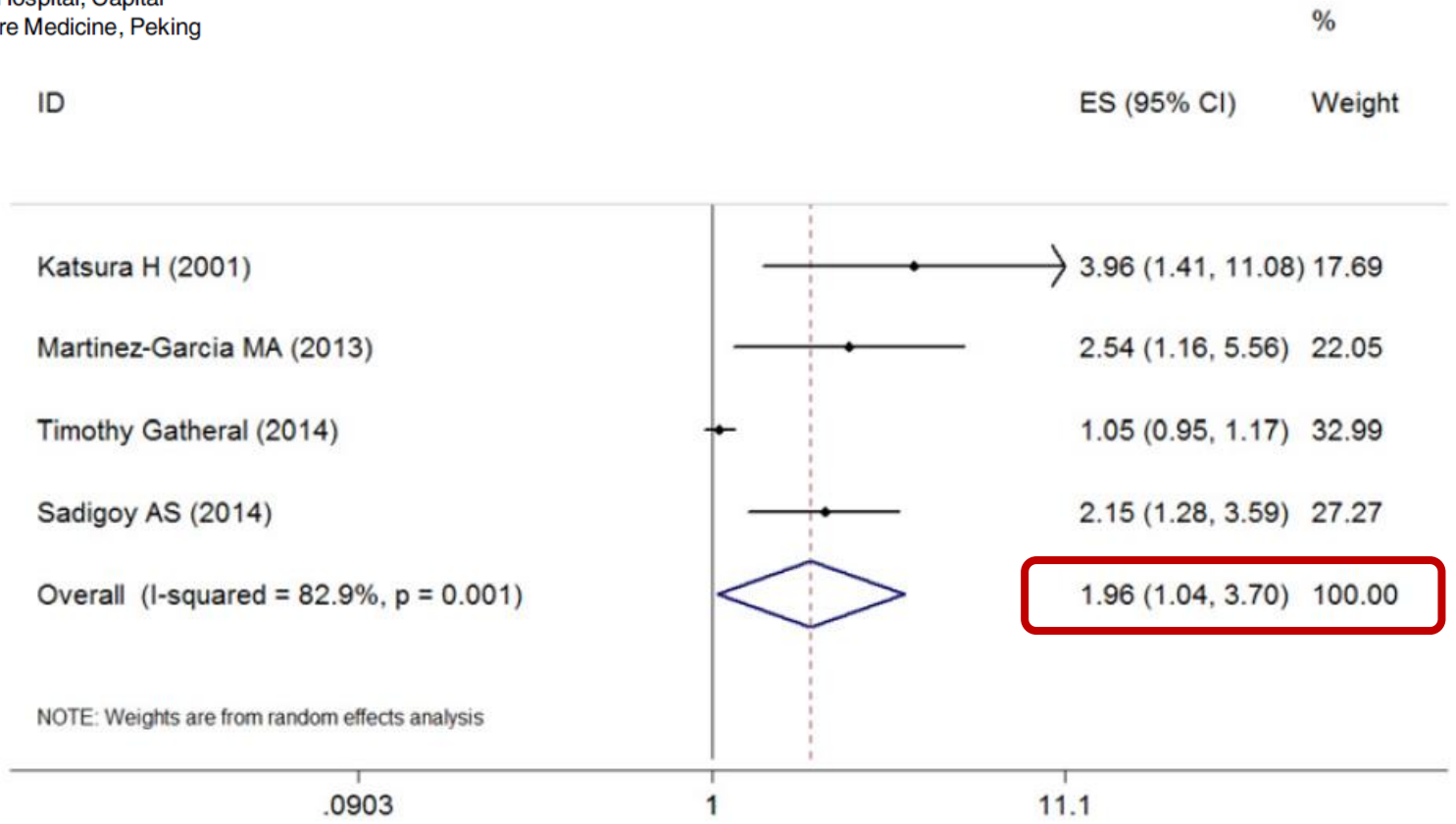


Fig 5. Odd ratios for the association between comorbid bronchiectasis and risk for mortality.

Du et al. Plos One 2016

COPD-related Bronchiectasis; Independent Impact on Disease Course and Outcomes

Mortality

BCOS vs COPD

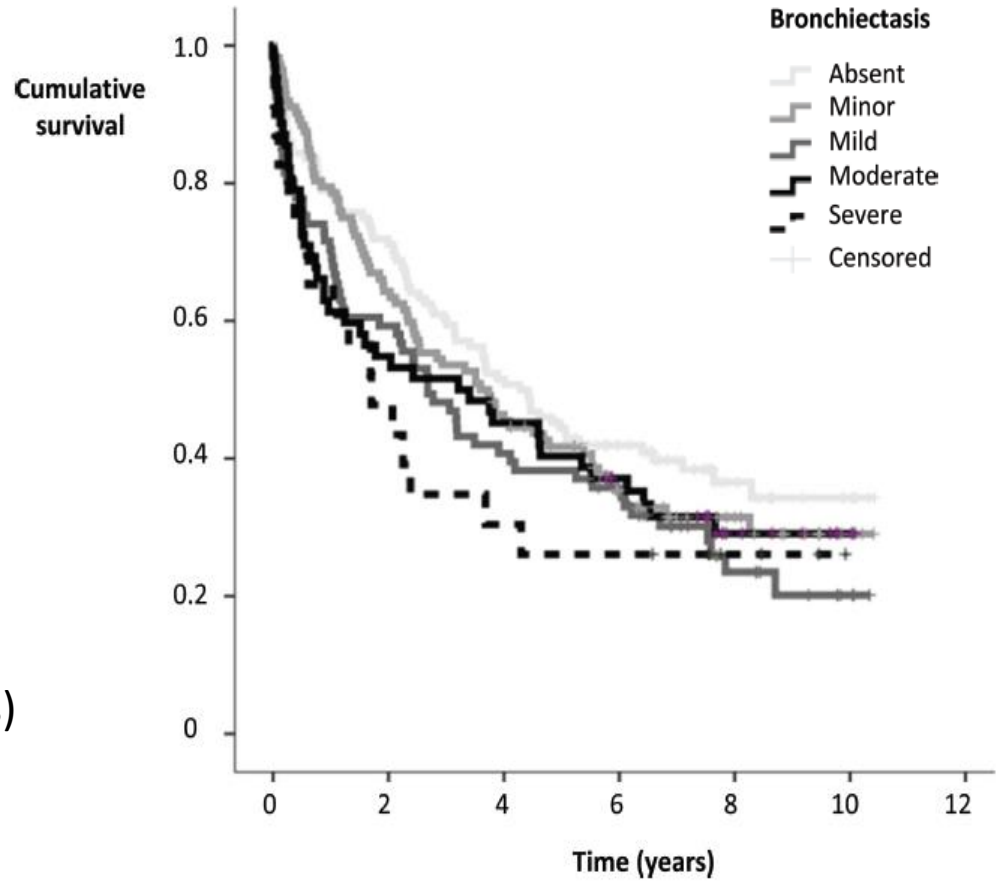
Timothy Gatheral, Neelam Kumar, Ben Sansom, Dilys Lai, Arjun Nair, Ioannis Vlahos & Emma H. Baker

106 patients were identified with suitable CT images retrospectively at first hospital admission for COPD exacerbation using ICD10 codes J44.0/1/8/9, UK

278 (69%) patients with evidence of bronchiectasis

-minor, 112 (40%)
-mild, 81 (29%)
-moderate, 62 (22%)
-severe 23 (8%)

BCO had **shorter survival** following CT scan (2.6 (0.5–6.7) years) than COPD only (3.8 (1.4–6.6) years) (p = 0.046)
Increasing severity bronchiectasis did not significantly determine post-CT scan survival p = 0.256



Gatheral et al. COPD 2014

Comorbidities and the risk of mortality in patients with bronchiectasis: an international cohort study

Melissa J McDonnell[1,2,3], Stefano Aliberti[4], Pieter C. Goeminne[5,6], Marcos I. Restrepo[7], Simon Finch[8], Alberto Pesci[8], Lieven J Dupont[5], Thomas C. Fardon[9], Robert Wilson[10], Michael R Loebinger[10], Dusan Skrbic[11], Dusanka Obradovic[11], Anthony De Soyza[2], Chris Ward[2], John G. Laffey[3,12], Robert M. Rutherford[1], and James D. Chalmers[9]

observational cohort analysis of 986 bronchiectasis patients across 4 European centers

Comorbidity	Hazard Ratio	95% CI	P value	Points
Metastatic malignancy	6.69	3.53-12.68	<0.0001	12
Haematological malignancy	2.85	1.17-6.97	0.02	6
COPD	2.22	1.53-3.23	<0.0001	5
Cognitive impairment	2.21	0.82-6.01	0.12	5
Inflammatory bowel disease	2.01	0.75-5.40	0.17	4
Liver disease	1.94	0.80-4.72	0.14	4
Connective tissue disease	1.78	1.19-2.68	0.005	3
Iron deficiency anaemia	1.78	0.80-2.68	0.16	3
Diabetes	1.76	1.10-2.80	0.02	3
Asthma	1.65	1.00-2.73	0.050	3
Pulmonary hypertension	1.58	0.88-2.84	0.12	3
Peripheral vascular disease	1.50	1.00-2.25	0.052	2
Ischaemic heart disease	1.31	0.91-1.89	0.14	2

McDonnell et al. Lancet Respir Med 2016

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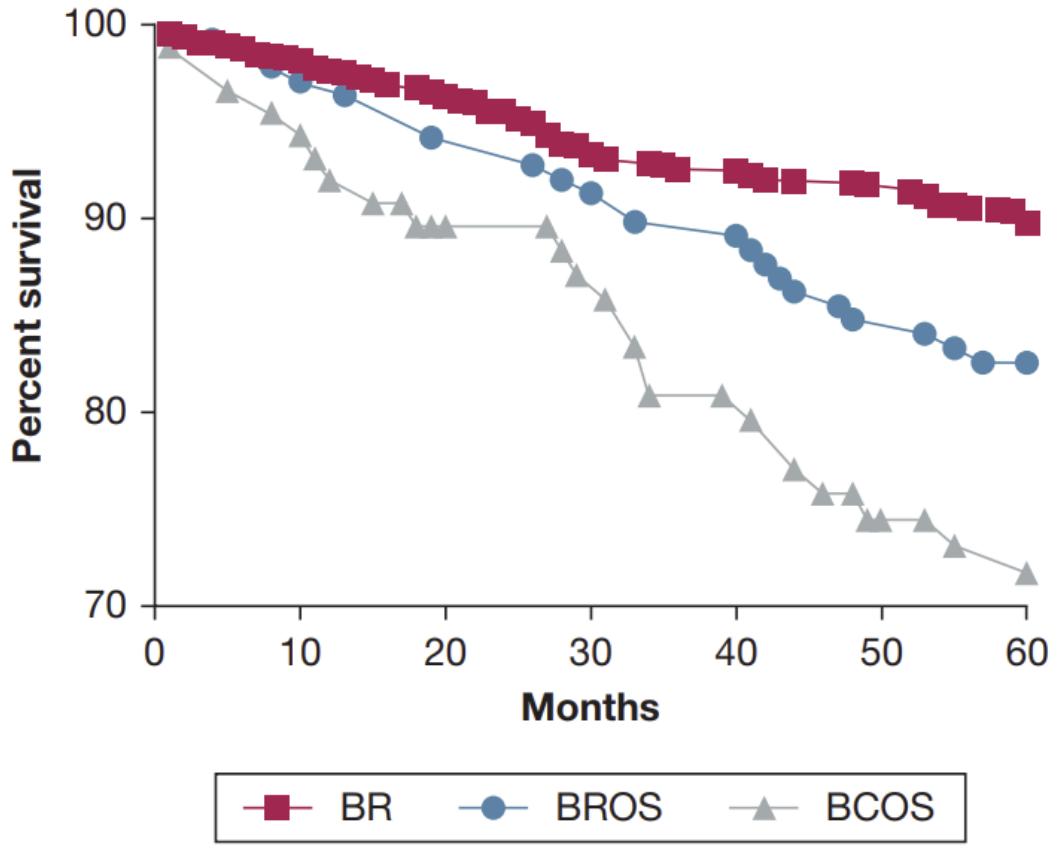
Mortality

BCO vs Bronchiectasis



1,716 BR patients in 6 centers: Edinburgh, Dundee, Newcastle, UK; Leuven, Belgium; Monza, Italy; Galway, Ireland

The mortality rate over a mean of 48 months of f/u

8.6% in other causes of BR
9.3% in idiopathic BR
18% in BROS
28.5% in BCOS

OR = **2.47** [95% CI, 1.55-3.92]

Figure 2 – *Kaplan-Meier survival curve is shown both for BCOS and BROS. BCOS = bronchiectasis and COPD overlap syndrome; BR = bronchiectasis; BROS = bronchiectasis-rheumatoid arthritis overlap syndrome.*

De Soyza et al. Chest 2017

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- Prevalence
- Impact on Mortality
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Clinical characteristics of patients with chronic obstructive pulmonary disease with comorbid bronchiectasis: a systemic review and meta-analysis

Yingmeng Ni
Guochao Shi
Youchao Yu
Jimin Hao
Tiantian Chen
Huihui Song

Department of Pulmonary Medicine, Ruijin Hospital, Shanghai Jiao Tong University School of Medicine, Shanghai, People's Republic of China

Exacerbation

BCO vs COPD

Study or subgroup	With bronchiectasis Events	Total	Without bronchiectasis Events	Total	Weight	Odds ratio M–H, fixed, 95% CI	Year
Fujimoto et al[11]	38	44	29	39	9.0%	2.18 (0.71, 6.70)	2006
Bafadhel et al[1]	0	0	0	0		Not estimable	2011
Martínez-García et al[7]	34	53	14	39	12.4%	3.20 (1.35, 7.57)	2011
Tulek et al[12]	27	27	26	26		Not estimable	2013
Martínez-García et al[13]	84	115	44	86	29.2%	2.59 (1.43, 4.67)	2013
Gatheral et al[4]	225	278	88	128	49.4%	1.93 (1.20, 3.11)	2014
Total (95% CI)		**490**		**292**	**100%**	**2.30 (1.66, 3.19)**	
Total events	381		175				

Heterogeneity: χ^2=1.24, *df*=3 (*P*=0.74); I^2=0%
Test for overall effect: *Z*=5.03 (*P*<0.00001)

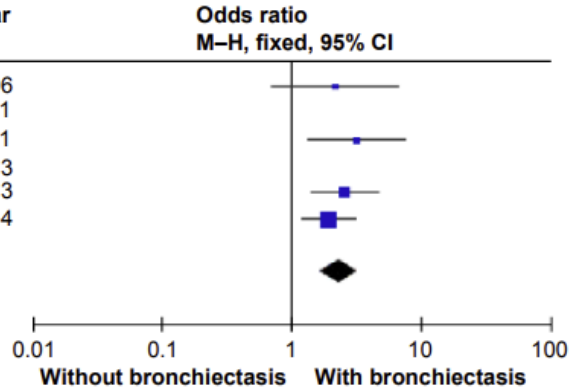


Figure 5 Forest plot of odds ratios of daily sputum production in COPD patients with and without bronchiectasis.

Sputum production

Study or subgroup	With bronchiectasis Mean	SD	Total	Without bronchiectasis Mean	SD	Total	Weight	Mean difference IV, random, 95% CI	Year
Fujimoto et al[11]	1.36	0.35	44	0.7	0.22	39	21.8%	0.66 (0.54, 0.78)	2006
Bafadhel et al[1]	4.6	0.6	33	3.7	0.9	13	20.5%	0.90 (0.37, 1.43)	2011
Martínez-García et al[7]	4.87	3.82	53	2.36	2.28	39	16.1%	2.51 (1.26, 3.76)	2011
Martínez-García et al[13]	1.88	2.13	115	1	1.48	86	20.7%	0.88 (0.38, 1.38)	2013
Tulek et al[12]	3.3	1.03	27	0.3	0.5	26	20.9%	3.00 (2.57, 3.43)	2013
Gatheral et al[4]	0	0	0	0	0	0		Not estimable	2014
Total (95% CI)			**272**			**203**	**100%**	**1.54 (0.56, 2.53)**	

Heterogeneity: τ^2=1.15; χ^2=110.26, *df*=4 (*P*<0.00001); I^2=96%
Test for overall effect: *Z*=3.07 (*P*=0.002)

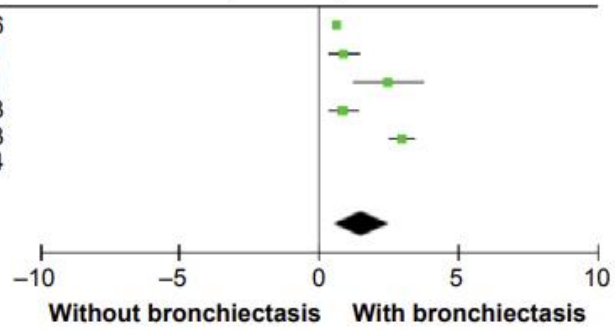


Figure 6 Forest plot of mean difference in exacerbations in COPD patients with and without bronchiectasis.

Exacerbation

Ni et al. Int Jr COPD 2015

Bronchiectasis as a Comorbidity of Chronic Obstructive Pulmonary Disease: A Systematic Review and Meta-Analysis

Exacerbation

BCO vs COPD

Qingxia Du[1], Jianmin Jin[1], Xiaofang Liu[1], Yongchang Sun[1,2]*

1 Department of Respiratory Medicine and Department of Emergency, Beijing Tongren Hospital, Capital Medical University, Beijing, 100730, China, **2** Department of Respiratory and Critical Care Medicine, Peking University Third Hospital, Beijing, 100191 China

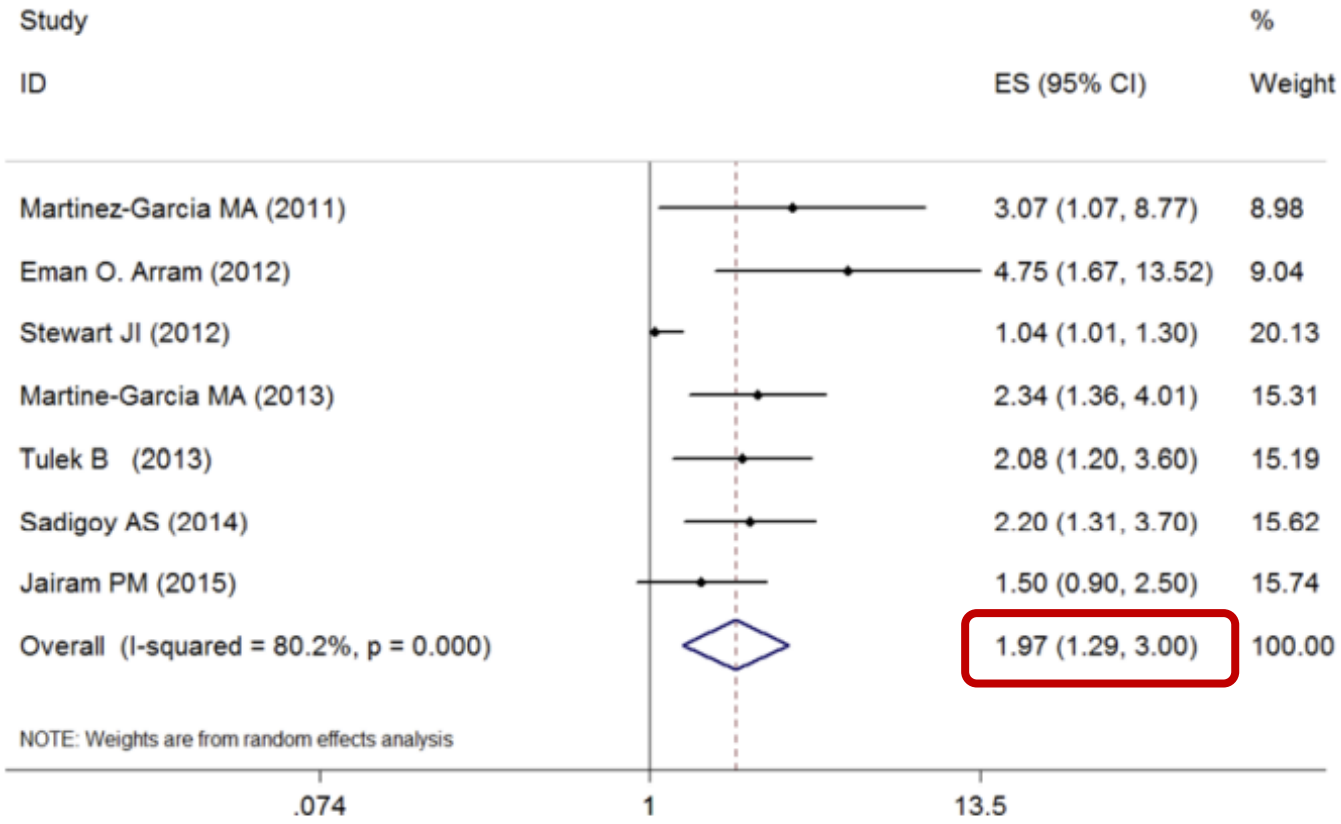


Fig 2. Odd ratios for the association between comorbid bronchiectasis and risk for COPD exacerbations.

Du et al. Plos One 2016

Chronic Obstructive Pulmonary Disease Is Associated With Decreased Quality of Life in Bronchiectasis Patients: Findings From the KMBARC Registry

Sang Hyuk Kim[1], Changhwan Kim[2], Ina Jeong[3], Seung Jun Lee[4], Tae Hyung Kim[5], Chang Youl Lee[6], Yeon-Mok Oh[7], Hyun Lee[5†] and Youlim Kim[6*†] on behalf of the KMBARC*

Exacerbation

BCO vs Bronchiectasis

TABLE 1 | Clinical characteristics of the study population according to COPD status.

	Without COPD ($n = 372$)	With COPD ($n = 226$)	*p*-value
Age, years	65 (60–71)	67 (60–72)	0.025
Male, *n* (%)	130 (34.9)	134 (59.3)	<0.001
BMI, kg/m^2 ($n = 562$)	23 (21–25)	23 (21–26)	0.283
Current or ex-smoker, *n* (%)	99 (26.6)	112 (49.6)	<0.001
Symptoms			
mMRC ≥ 2, *n* (%)	58 (15.6)	72 (31.9)	<0.001
Purulent sputum production ($n = 583$)	125 (34.2)	45 (20.7)	<0.001
Disease severity			
Acute exacerbation, *n* (%)	189 (50.8)	133 (58.8)	0.067
Severity index ($n = 582$)			
BSI	5 (4–8)	7 (5–11)	<0.001
FACED	1 (0–3)	3 (1–4)	<0.001
Isolation of *Pseudomonas aeruginosa*, *n* (%)	33 (8.9)	33 (14.6)	0.042

Kim et al. Frontiers in Med 2021

The effect of the presence and severity of bronchiectasis on the respiratory functions, exercise capacity, dyspnea perception, and quality of life in patients with chronic obstructive pulmonary disease

Hulya Sahin, Ilknur Naz[1], Seher Susam[2], Ahmet Emin Erbaycu[3], Serhan Olcay[4]

Airway obstruction

BCO vs COPD

Variables	COPD (Group 1) (*n*=245)	COPD + bronchiectasis (Group 2) (*n*=142)	*P*
Age (years)	62 (56-67)	64 (57-71)	0.081
BMI (kg/m^2)	28 (24-31)	25 (21-30)	<0.001*
Males, *n* (%)	179 (73.1)	120 (84.5)	0.009**
Cigarette consumption (pack-year)	50 (30-75)	50 (25-90)	0.727
Previous tuberculosis, *n* (%)	21 (8.5)	30 (21.1)	<0.001**
Emergency admission (*n*/last/year)	1 (0-3)	2 (1-5)	<0.001*
Hospitalization (*n*/last 1 year)	0 (0-1)	1 (0-2)	<0.001*
Positive sputum culture (*Pseudomonas aeruginosa*), *n* (%)	4 (1.63)	17 (11.9)	<0.001**
COPD stage, *n* (%)			
Stage 3	153 (62.4)	91 (64.1)	0.874
Stage 4	92 (37.6)	51 (35.9)	
Pulmonary function test			
FEV_1 (%)	46 (37-50)	42 (30-46)	0.062
FEV_1/FVC	62 (58-67)	57 (47-63)	0.073
TLCO (%)	41 (28-53)	29 (17-49)	<0.001*

TLCO=Carbon-monoxide diffusion capacity

Sahin et al. Ann Thorac Med 2020

Clinical characteristics of patients with chronic obstructive pulmonary disease with comorbid bronchiectasis: a systemic review and meta-analysis

Yingmeng Ni
Guochao Shi
Youchao Yu
Jimin Hao
Tiantian Chen
Huihui Song

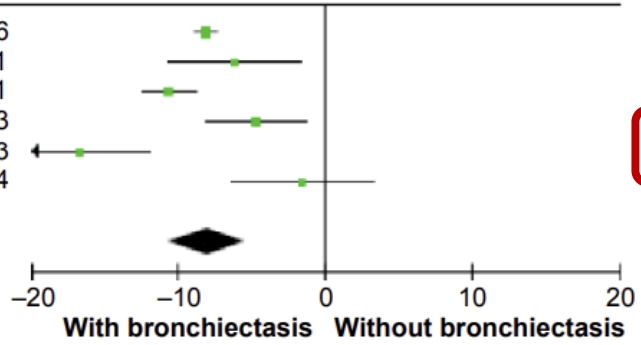
Department of Pulmonary Medicine, Ruijin Hospital, Shanghai Jiao Tong University School of Medicine, Shanghai, People's Republic of China

Airway obstruction

BCO vs COPD

Study or subgroup	With bronchiectasis Mean	SD	Total	Without bronchiectasis Mean	SD	Total	Weight	Mean difference IV, random, 95% CI	Year
Fujimoto et al[11]	43.5	1.6	44	51.6	1.8	39	22.9%	–8.10 (–8.84, –7.36)	2006
Martínez-García et al[7]	45.1	11.9	53	51.2	10.1	39	13.7%	–6.10 (–10.61, –1.59)	2011
Bafadhel et al[1]	48.4	2.3	33	59	3	13	21.0%	–10.60 (–12.41, –8.79)	2011
Martínez-García et al[13]	50.5	12.9	115	55.2	11.8	86	16.6%	–4.70 (–8.13, –1.27)	2013
Tulek et al[12]	48.1	10.9	26	64.8	6.2	26	13.0%	–16.70 (–21.52, –11.88)	2013
Gatheral et al[4]	53.5	16.7	135	55	16	63	12.9%	–1.50 (–6.35, 3.35)	2014
Total (95% CI)			**406**			**266**	**100%**	**–8.05 (–10.65, –5.45)**	

Heterogeneity: τ^2=7.57; χ^2=30.84, *df*=5 (*P*<0.0001); I^2=84%
Test for overall effect: *Z*=6.06 (*P*<0.00001)

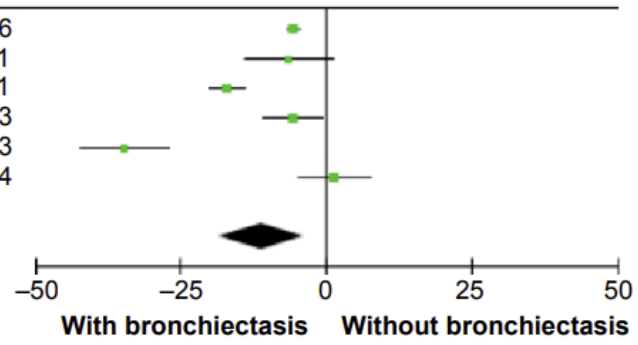


FEV$_1$/FVC%

Figure 7 Forest plot of mean difference of postbronchodilator FEV$_1$/FVC% in COPD patients with and without bronchiectasis.

Study or subgroup	With bronchiectasis Mean	SD	Total	Without bronchiectasis Mean	SD	Total	Weight	Mean difference IV, random, 95% CI	Year
Fujimoto et al[11]	42	2.2	44	47.5	2.5	39	18.4%	–5.50 (–6.52, –4.48)	2006
Martínez-García et al[7]	77.3	18.2	53	83.7	18.7	39	15.3%	–6.40 (–14.05, 1.25)	2011
Bafadhel et al[1]	45	4.3	33	62	5	13	17.9%	–17.00 (–20.09, –13.91)	2011
Martínez-García et al[13]	68.6	17.8	115	74.3	18.5	86	16.9%	–5.70 (–10.79, –0.61)	2013
Tulek et al[12]	39.6	12.3	27	74.2	15.7	26	15.3%	–34.60 (–42.21, –26.99)	2013
Gatheral et al[4]	52.4	24.4	135	51	19	63	16.2%	1.40 (–4.84, 7.64)	2014
Total (95% CI)			**407**			**266**	**100%**	**–11.06 (–18.27, –3.85)**	

Heterogeneity: τ^2=73.23; χ^2=106.20, *df*=5 (*P*<0.00001); I^2=95%
Test for overall effect: *Z*=3.01 (*P*=0.003)



FEV$_1$%

Figure 8 Forest plot of mean difference of postbronchodilator FEV$_1$% predicted in COPD patients with and without bronchiectasis.

Ni et al. Int Jr COPD 2015

Bronchiectasis as a Comorbidity of Chronic Obstructive Pulmonary Disease: A Systematic Review and Meta-Analysis

Airway obstruction

BCO vs COPD

Qingxia Du[1], Jianmin Jin[1], Xiaofang Liu[1], Yongchang Sun[1,2]*

1 Department of Respiratory Medicine and Department of Emergency, Beijing Tongren Hospital, Capital Medical University, Beijing, 100730, China, **2** Department of Respiratory and Critical Care Medicine, Peking University Third Hospital, Beijing, 100191 China

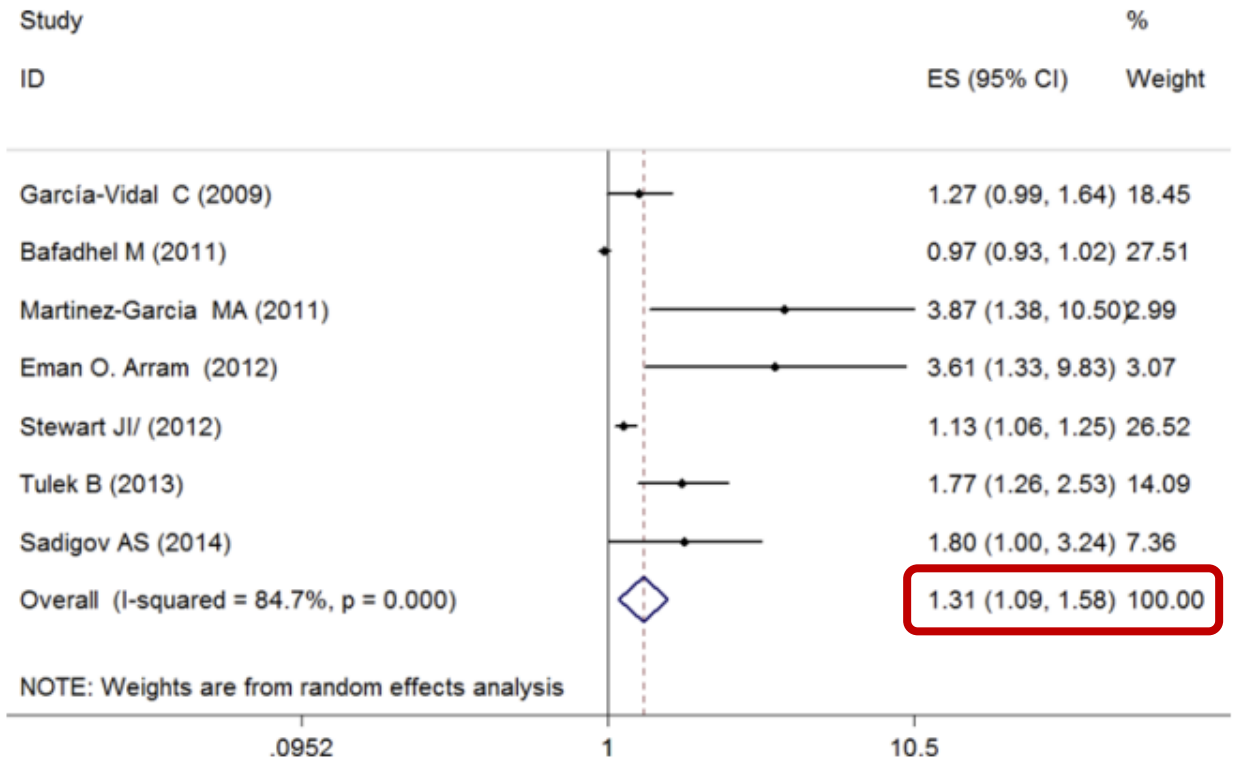


Fig 4. Odd ratios for the association between comorbid bronchiectasis and risk for severe airway obstruction.

Severe airway obstruction

Du et al. Plos One 2016

COPD-related Bronchiectasis; Independent Impact on Disease Course and Outcomes

Timothy Gatheral, Neelam Kumar, Ben Sansom, Dilys Lai, Arjun Nair, Ioannis Vlahos & Emma H. Baker

Table 2. Demographics and lung function of patients with increasing severity bronchiectasis

	Bronchiectasis					
	Absent	Minor	Mild	Moderate	Severe	*p* value
Age (years) (n)	69 ± 11 (128)	72 ± 11 (112)	74 ± 10 (81)	72 ± 11 (62)	72 ± 11 (23)	**0.004**
Male sex (%)	50	52	56	73	70	**0.001**
	Lung function					
FEV_1 %predicted (n)	51 ± 19 (63)	51 ± 21 (57)	55 ± 28 (42)	51 ± 25 (36)	61 ± 27 (10)	0.627
FEV_1:FVC %	55 ± 16	54 ± 17	55 ± 16	51 ± 17	68 ± 21	0.088
DLCOc %predicted (n)	47 ± 16 (31)	48 ± 24 (26)	50 ± 26 (24)	43 ± 18 (22)	41 ± 11 (6)	0.700
RV % predicted (n)	181 ± 57 (22)	174 ± 51 (19)	177 ± 58 (19)	185 ± 90 (17)	89 ± 31 (5)	0.054
TLC % predicted	118 ± 19	117 ± 21	120 ± 23	124 ± 23	79 ± 15	**0.002**
RV:TLC %	61 ± 13	60 ± 9	59 ± 13	57 ± 19	51 ± 13	0.608

Data represented as mean ± SD or %. *Statistical significance was determined by 1-way ANOVA for continuous data or by Chi-Square analysis for categorical data. *P* values <0.05 were considered significant and are indicated in bold font.

Gatheral et al. COPD 2014

Chronic Obstructive Pulmonary Disease Is Associated With Decreased Quality of Life in Bronchiectasis Patients: Findings From the KMBARC Registry

Airway obstruction

BCO vs Bronchiectasis

Sang Hyuk Kim[1], Changhwan Kim[2], Ina Jeong[3], Seung Jun Lee[4], Tae Hyung Kim[5], Chang Youl Lee[6], Yeon-Mok Oh[7], Hyun Lee[5†] and Youlim Kim[6*†] on behalf of the KMBARC*

TABLE 1 | Clinical characteristics of the study population according to COPD status.

	Without COPD ($n = 372$)	With COPD ($n = 226$)	p-value
Age, years	65 (60–71)	67 (60–72)	0.025
Male, n (%)	130 (34.9)	134 (59.3)	<0.001
BMI, kg/m^2 ($n = 562$)	23 (21–25)	23 (21–26)	0.283
Current or ex-smoker, n (%)	99 (26.6)	112 (49.6)	<0.001
Pre-bronchodilator spirometry results			
FVC (L)	2.5 (2.0–3.1)	2.4 (1.9–3.0)	0.104
FVC (%-predicted)	75.7 (66.7–86.7)	67.9 (55.8–79.0)	<0.001
FEV_1 (L)	1.8 (1.4–2.1)	1.4 (1.0–1.8)	<0.001
FEV_1 (%-predicted)	71.2 (57.3–82.4)	53.2 (42.3–64.2)	<0.001
FEV_1/FVC (%)	71.6 (63.2–77.1)	59.2 (50.3–65.8)	<0.001

Kim et al. Frontiers in Med 2021

Clinical characteristics of patients with chronic obstructive pulmonary disease with comorbid bronchiectasis: a systemic review and meta-analysis

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Department of Pulmonary Medicine, Ruijin Hospital, Shanghai Jiao Tong University School of Medicine, Shanghai, People's Republic of China

Inflammatory Markers

BCO vs COPD

CRP

Study or subgroup	With bronchiectasis Mean	SD	Total	Without bronchiectasis Mean	SD	Total	Weight	Mean difference IV, random, 95% CI	Year
Fujimoto et al[11]	0	0	0	0	0	0		Not estimable	2006
Bafadhel et al[1]	0	0	0	0	0	0		Not estimable	2011
Martínez-García et al[7]	9.9	45.5	53	5.2	4.09	39	15.0%	4.70 (–7.62, 17.02)	2011
Martínez-García et al[13]	8.36	83	115	5.33	4.04	86	43.6%	3.03 (1.29, 4.77)	2013
Tulek et al[12]	13.36	7.13	27	3.5	0.7	26	41.3%	9.86 (7.16, 12.56)	2013
Gatheral et al[4]	0	0	0	0	0	0		Not estimable	2014
Total (95% CI)			**195**			**151**	**100%**	**6.11 (0.26, 11.95)**	

Heterogeneity: τ^2=19.59; χ^2=17.34, *df*=2 (*P*=0.0002); I^2=88%
Test for overall effect: *Z*=2.05 (*P*=0.04)

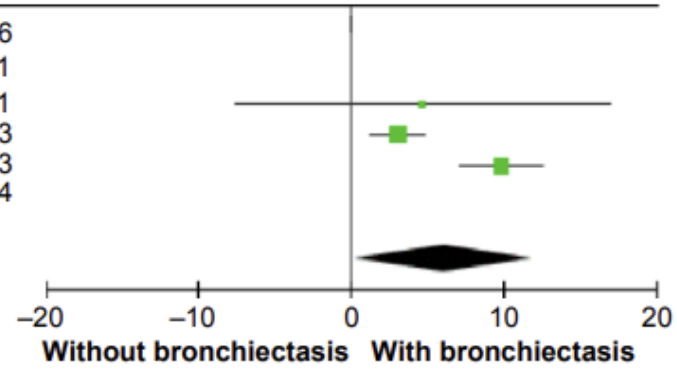

Figure 9 Forest plot of mean difference of CRP in COPD patients with and without bronchiectasis.
Abbreviations: CI, confidence interval; COPD, chronic obstructive pulmonary disease; CRP, C-reactive protein; IV, inverse variance; SD, standard deviation.

Ni et al. Int Jr COPD 2015

Bronchiectasis, Exacerbation Indices, and Inflammation in Chronic Obstructive Pulmonary Disease

Irem S. Patel, Ioannis Vlahos, Tom M. A. Wilkinson, Simon J. Lloyd-Owen, Gavin C. Donaldson, Mark Wilks, Rodney H. Reznek, and Jadwiga A. Wedzicha

Academic Unit of Respiratory Medicine, Academic Radiology, St Bartholomew's and the Royal London Hospital School of Medicine and Dentistry; Microbiology and Virology Clinical Group, St Bartholomew's and the Royal London Hospital NHS Trust, London, United Kingdom

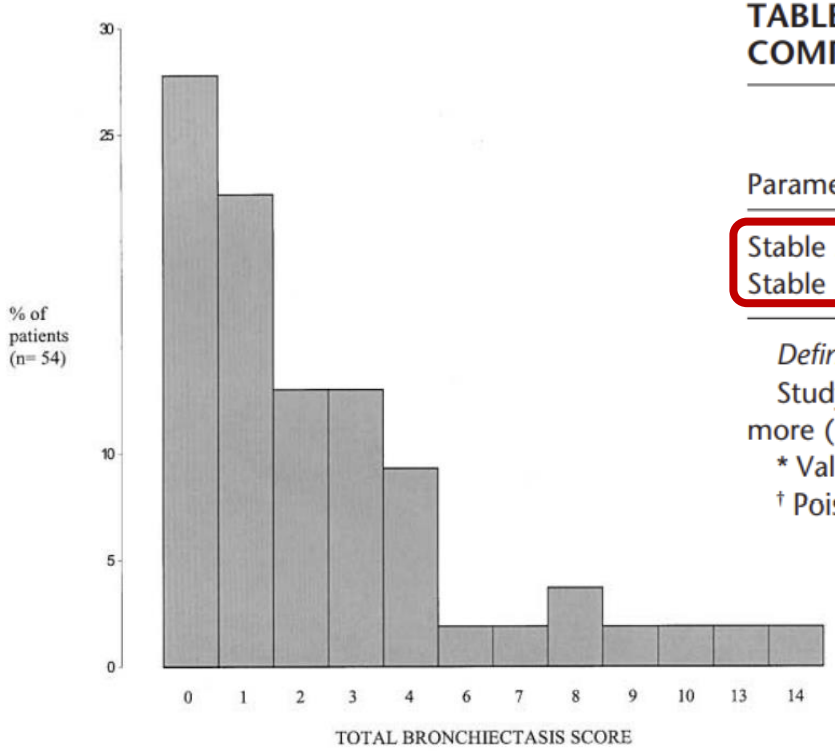

TABLE 3. RELATIONSHIP BETWEEN THE PRESENCE OF BRONCHIECTASIS ON HIGH-RESOLUTION COMPUTED TOMOGRAPHY SCANNING AND AIRWAY INFLAMMATORY CYTOKINE LEVELS

	Total Bronchiectasis Score		
Parameter*	0 or 1 (*n* = 27)	⩾ 2 (*n* = 27)	p Value†
Stable sputum IL-8 level, pg/ml	3,897 (1,772–4,733)	3,939 (3,173–5,528)	0.001
Stable sputum IL-6 level, pg/ml	50.2 (13.6–213)	113.2 (20.1–218.9)	0.001

Definition of abbreviation: IL = interleukin.

Study subjects were divided into those patients with a total bronchiectasis score of 0 or 1 and those with a total score of 2 or more (n = 27 of 54, or 50% in each group).

* Values for airway inflammatory cytokine levels indicate medians (IQR).

† Poisson regression.

Patel et al. AJRCCM 2004

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Microbiology

BCO vs COPD

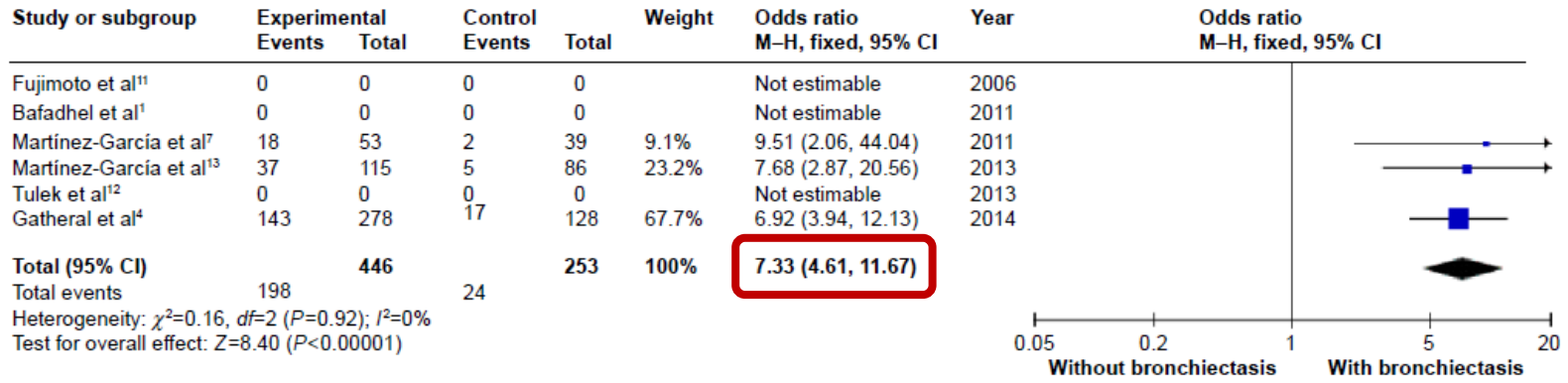


Figure 11 Forest plot of odds ratios of chronic PPM colonization in COPD patients with and without bronchiectasis.
Abbreviations: CI, confidence interval; COPD, chronic obstructive pulmonary disease; M–H, Mantel-Haenszel method; PPM, potentially pathogenic microorganisms.

Potentially pathogenic microorganisms

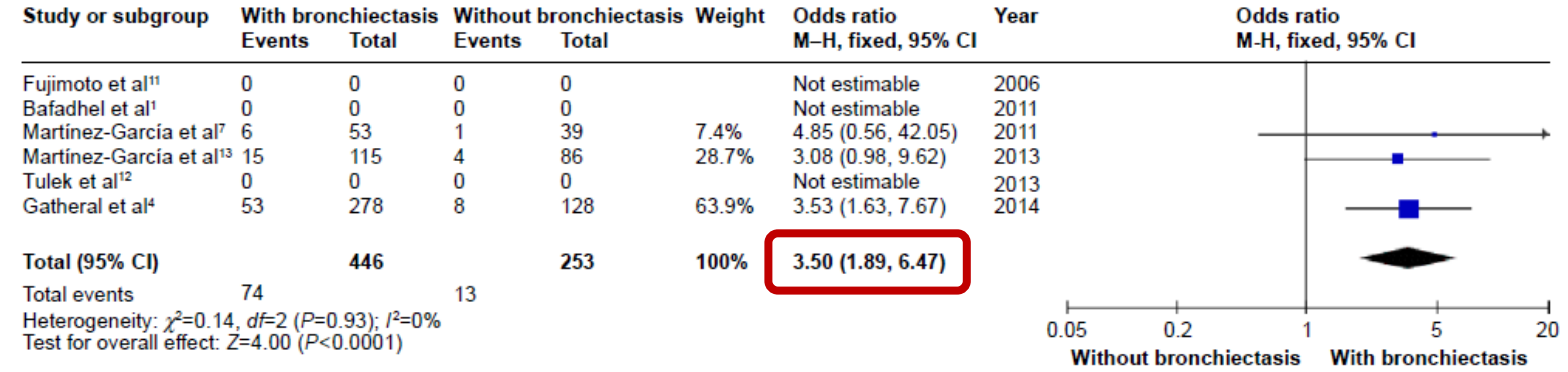


Figure 12 Forest plot of odds ratios of *Pseudomonas aeruginosa* isolation in COPD patients with and without bronchiectasis.
Abbreviations: CI, confidence interval; COPD, chronic obstructive pulmonary disease; M–H, Mantel-Haenszel method.

P. aeruginosa

Ni et al. Int Jr COPD 2015

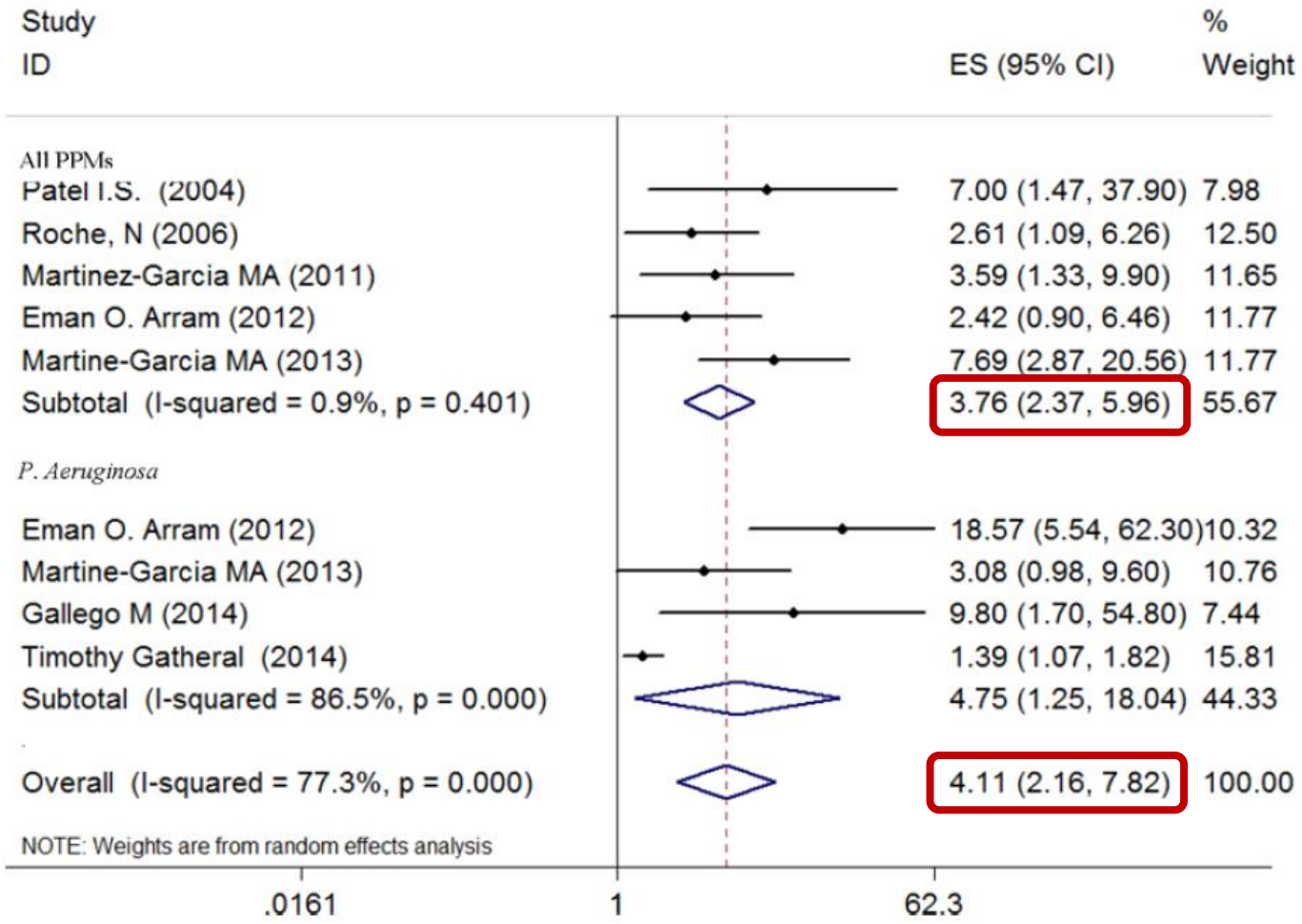
Bronchiectasis as a Comorbidity of Chronic Obstructive Pulmonary Disease: A Systematic Review and Meta-Analysis

Qingxia Du[1], Jianmin Jin[1], Xiaofang Liu[1], Yongchang Sun[1,2]*

1 Department of Respiratory Medicine and Department of Emergency, Beijing Tongren Hospital, Capital Medical University, Beijing, 100730, China, 2 Department of Respiratory and Critical Care Medicine, Peking University Third Hospital, Beijing, 100191 China

Microbiology

BCO vs COPD



Potentially pathogenic microorganisms

P. aeruginosa

Fig 3. Odd ratios for the association between comorbid bronchiectasis and risk for isolation of a potentially pathogenic microorganism.

Du et al. Plos One 2016

COPD-related Bronchiectasis; Independent Impact on Disease Course and Outcomes

Timothy Gatheral, Neelam Kumar, Ben Sansom, Dilys Lai, Arjun Nair, Ioannis Vlahos & Emma H. Baker

Table 3. Sputum microbiology of patients with increasing severity bronchiectasis

	Bronchiectasis					
	Absent	Minor	Mild	Moderate	Severe	*p* value
Patients with at least one sputum sample	69%	77%	78%	89%	87%	**0.027**
Number of sputum samples	1 (0–4)	2 (1–6)	3 (1–6)	4 (1–7)	3 (2–6)	**<0.001**
Number of organisms acquired	1 (0–2)	2 (1–3)	1 (0–3)	2 (1–3)	2 (1–3)	**<0.001**
Patients with persistent infection (%)	17	32	26	35	50	**0.003**
	Individual organisms acquired					
S. pneumoniae (%)	8	8	14	16	15	0.059
H. influenzae (%)	17	35	22	26	30	**0.003**
M. catarrhalis (%)	3	14	14	9	0	**0.006**
S. aureus (%)	15	20	11	18	30	**0.036**
Coliforms (%)	30	42	41	51	45	**0.008**
Ps. aeruginosa (%)	9	27	29	35	45	**<0.001**
Atypical mycobacteria (%)	0	0	2	6	5	**0.036**
Aspergillus	1	4	6	6	0	**0.029**

Data represented as median (interquartile range) or %. *Statistical significance was determined by 1-way ANOVA for continuous data or by Chi-Square analysis for categorical data. *P* values <0.05 were considered significant and are indicated in bold font.

Increasing severity bronchiectasis was an independent predictor of isolation of

Pseudomonas aeruginosa (**OR 1.39** (95% CI 1.07 to 1.80), $p = 0.013$)

Atypical mycobacteria (**OR 2.44** (95% CI 1.04 to 5.69), $p = 0.040$)

Gatheral et al. COPD 2014

INDEX

- Prevalence
- Impact on Mortality
- Impact on Morbidity
  - Exacerbation
  - Airway obstruction
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- Comorbidities

Clinical characteristics of patients with chronic obstructive pulmonary disease with comorbid bronchiectasis: a systemic review and meta-analysis

Yingmeng Ni
Guochao Shi
Youchao Yu
Jimin Hao
Tiantian Chen
Huihui Song

Department of Pulmonary Medicine, Ruijin Hospital, Shanghai Jiao Tong University School of Medicine, Shanghai, People's Republic of China

Characteristics

BCO vs COPD

Age

Study or subgroup	With bronchiectasis Mean	SD	Total	Without bronchiectasis Mean	SD	Total	Weight	Mean difference IV, random, 95% CI	Year
Fujimoto et al[11]	68.4	1.7	44	68.3	1.8	39	30.8%	0.10 (–0.66, 0.86)	2006
Bafadhel et al[1]	69.7	12.8	33	68	13.2	13	3.8%	1.70 (–6.70, 10.10)	2011
Martínez-García et al[7]	72.6	8.7	53	69.1	9.7	39	12.7%	3.50 (–0.34, 7.34)	2011
Martínez-García et al[13]	71.4	8.5	115	68.8	9.3	86	19.5%	2.60 (0.09, 5.11)	2013
Tulek et al[12]	68	7.3	27	68	7.3	26	12.3%	0.00 (–3.93, 3.93)	2013
Gatheral et al[4]	72.6	11	278	69	11	128	20.8%	3.60 (1.30, 5.90)	2014
Total (95% CI)			**550**			**331**	**100%**	**1.80 (0.05, 3.55)**	

Heterogeneity: τ^2=2.43; χ^2=12.94, *df*=5 (*P*=0.02); I^2=61%
Test for overall effect: *Z*=2.02 (*P*=0.04)

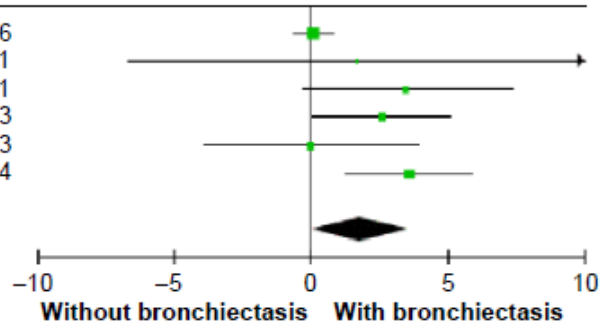

Figure 2 Forest plot of mean difference of age in COPD patients with and without bronchiectasis.

Sex

Study or subgroup	With bronchiectasis Events	Total	Without bronchiectasis Events	Total	Weight	Odds ratio M–H, fixed, 95% CI	Year
Fujimoto et al[11]	34	44	25	39	11.9%	1.90 (0.73, 4.98)	2006
Martínez-García et al[7]	52	53	39	39	2.5%	0.44 (0.02, 11.17)	2011
Bafadhel et al[1]	28	33	8	13	3.4%	3.50 (0.81, 15.19)	2011
Martínez-García et al[13]	107	115	75	86	11.8%	1.96 (0.75, 5.11)	2013
Tulek et al[12]	0	0	0	0		Not estimable	2013
Gatheral et al[4]	165	278	64	128	70.4%	1.46 (0.96, 2.22)	2014
Total (95% CI)		**523**		**305**	**100%**	**1.62 (1.15, 2.28)**	
Total events	386		211				

Heterogeneity: χ^2=2.17, *df*=4 (*P*=0.70); I^2=0%
Test for overall effect: *Z*=2.74 (*P*=0.006)

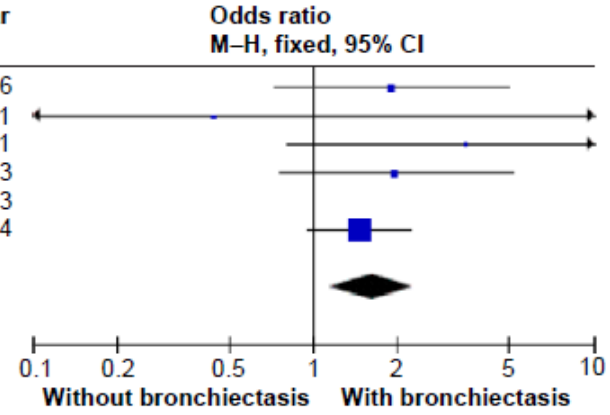

Figure 3 Forest plot of odds ratios of sex in COPD patients with and without bronchiectasis.

BCO vs COPD

Smoking PY

Study or subgroup	With bronchiectasis Mean	SD	Total	Without bronchiectasis Mean	SD	Total	Weight	Mean difference IV, fixed, 95% CI	Year
Fujimoto et al[11]	46.6	5.1	39	41.8	10.7	39	65.7%	4.80 (1.08, 8.52)	2006
Martínez-García et al[7]	69.8	40.1	53	60.6	33.4	39	4.0%	9.20 (–5.85, 24.25)	2011
Bafadhel et al[1]	52	48.3	33	35	19.6	13	2.4%	17.00 (–2.62, 36.62)	2011
Tulek et al[12]	34.2	11.5	27	32.5	18	26	13.6%	1.70 (–6.47, 9.87)	2013
Martínez-García et al[13]	62.1	31.9	115	58.8	25.9	86	14.2%	3.30 (–4.70, 11.30)	2013
Gatheral et al[4]	0	0	0	0	0	0		Not estimable	2014
Total (95% CI)			**267**			**203**	**100%**	**4.63 (1.61, 7.65)**	

Heterogeneity: χ^2=2.49, *df*=4 (*P*=0.65); I^2=0%

Test for overall effect: *Z*=3.01 (*P*=0.003)

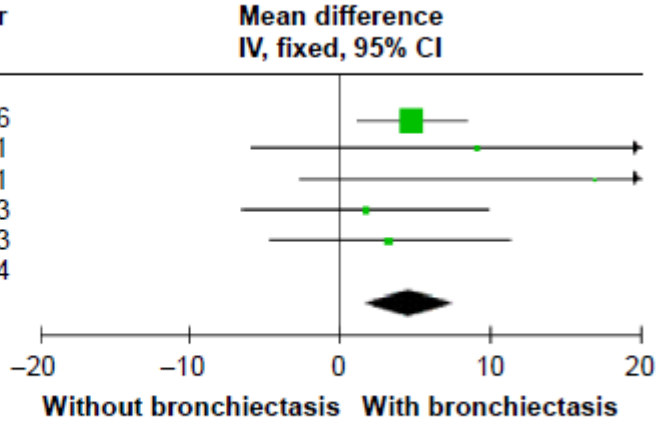

Figure 4 Forest plot of mean difference of smoking history (pack-years) in COPD patients with and without bronchiectasis.

Ni et al. Int Jr COPD 2015

The effect of the presence and severity of bronchiectasis on the respiratory functions, exercise capacity, dyspnea perception, and quality of life in patients with chronic obstructive pulmonary disease

Hulya Sahin, Ilknur Naz[1], Seher Susam[2], Ahmet Emin Erbaycu[3], Serhan Olcay[4]

BCO vs COPD

Variables	COPD (Group 1) (*n*=245)	COPD + bronchiectasis (Group 2) (*n*=142)	*P*
Age (years)	62 (56-67)	64 (57-71)	0.081
BMI (kg/m^2)	28 (24-31)	25 (21-30)	<0.001*
Males, *n* (%)	179 (73.1)	120 (84.5)	0.009**
Cigarette consumption (pack-year)	50 (30-75)	50 (25-90)	0.727
Previous tuberculosis, *n* (%)	21 (8.5)	30 (21.1)	<0.001**
Emergency admission (*n*/last/year)	1 (0-3)	2 (1-5)	<0.001*
Hospitalization (*n*/last 1 year)	0 (0-1)	1 (0-2)	<0.001*
Positive sputum culture (*Pseudomonas aeruginosa*), *n* (%)	4 (1.63)	17 (11.9)	<0.001**
Blood gas analysis			
PaO_2 (mmHg)	76 (67-83)	71 (62-80)	<0.001*
$PaCO_2$ (mmHg)	39 (36-44)	42 (39-46)	<0.001*
$SatO_2$ (mmHg)	95 (93-97)	94 (92-96)	0.001*
mMRC	3 (2-4)	4 (3-4)	0.001*
6MWD (m)	370 (310-430)	350 (248-410)	0.009*
SGRQ			
Symptom	53 (37-67)	61 (43-76)	0.015*
Activity	66 (54-79)	68 (54-86)	0.048*
Impact	44 (29-60)	51 (34-70)	0.003*
Total	53 (41-65)	58 (43-73)	0.006*

Sahin et al. Ann Thorac Med 2020

Table 2: Comparison of groups according to the bronchiectasis severity index

Variables	Mild (*n*=20)	Moderate (*n*=46)	Severe (*n*=77)	*P*
Males, *n* (%)	13 (65.0)	41 (89.1)	66 (86.80)	0.032**
Cigarette consumption (pack-year)	50 (23-98)	55 (25-98)	50 (30-80)	0.893
TLCO (%)	57 (29-67)	28 (18-46)	27 (15-43)	0.004*
Blood gas analysis				
PaO_2 (mmHg)	82 (71-88)	76 (71-84)	65 (56-73)	<0.001*
$PaCO_2$ (mmHg)	42 (37-44)	41 (38-44)	43 (40-50)	0.013*
$SatO_2$ (mmHg)	96 (95-97)	95 (94-96)	93 (90-95)	<0.001*
6MWD (m)	395 (350-428)	400 (320-440)	290 (200-364)	<0.001*
SGRQ				
Symptom	41 (22-59)	55 (40-72)	68 (54-81)	<0.001*
Activity	57 (42-73)	55 (48-79)	80 (67-93)	<0.001*
Impact	41 (32-52)	43 (29-60)	62 (45-74)	<0.001*
Total	47 (31-60)	49 (38-68)	68 (55-80)	<0.001*

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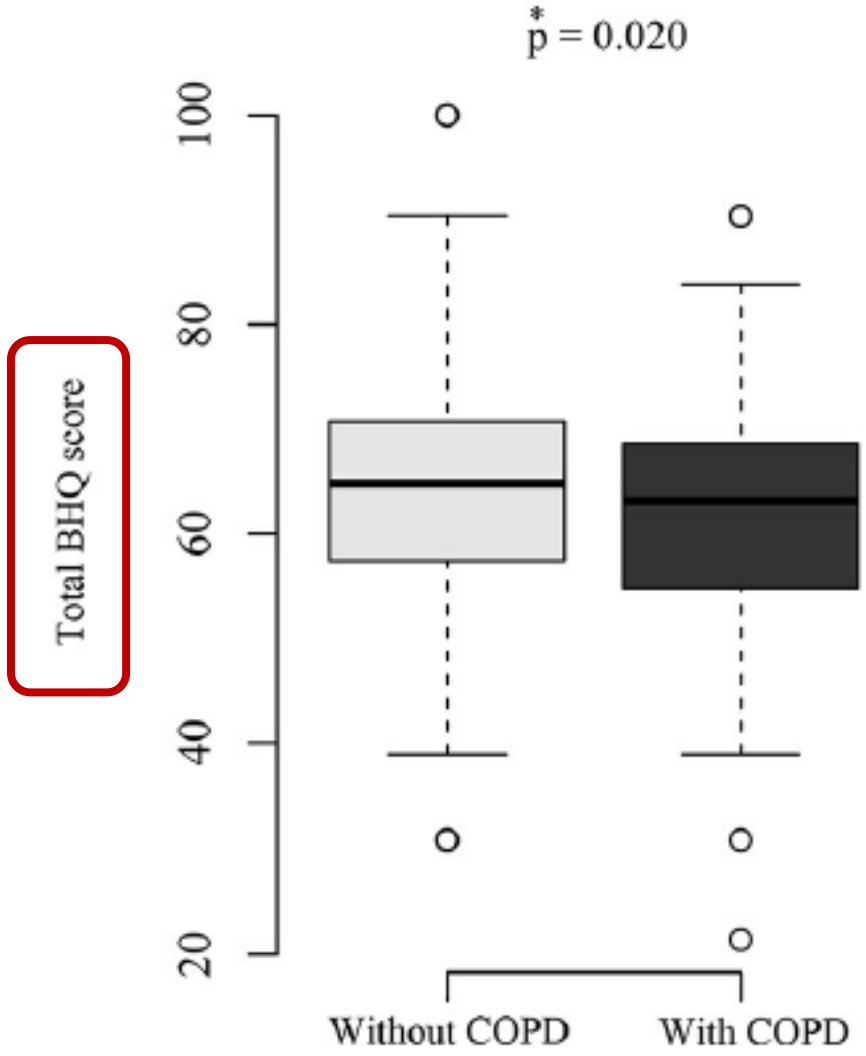
Chronic Obstructive Pulmonary Disease Is Associated With Decreased Quality of Life in Bronchiectasis Patients: Findings From the KMBARC Registry

Sang Hyuk Kim[1], Changhwan Kim[2], Ina Jeong[3], Seung Jun Lee[4], Tae Hyung Kim[5], Chang Youl Lee[6], Yeon-Mok Oh[7], Hyun Lee[5†] and Youlim Kim[6*†] on behalf of the KMBARC*

Characteristics

BCO vs Bronchiectasis



Kim et al. Frontiers in Med 2021

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Nutrition

Albumin

Study or subgroup	With bronchiectasis Mean	SD	Total	Without bronchiectasis Mean	SD	Total	Weight	Mean difference IV, fixed, 95% CI	Year
Fujimoto et al[11]	0	0	0	0	0	0		Not estimable	2006
Martínez-García et al[7]	4.14	0.39	53	4.31	0.26	39	42.4%	–0.17 (–0.30, –0.04)	2011
Bafadhel et al[1]	0	0	0	0	0	0		Not estimable	2011
Tulek et al[12]	3.95	0.43	27	4	0.5	26	11.9%	–0.05 (–0.30, 0.20)	2013
Martínez-García et al[13]	4.1	0.58	115	4.24	0.34	86	45.7%	–0.14 (–0.27, –0.01)	2013
Gatheral et al[4]	0	0	0	0	0	0		Not estimable	2014
Total (95% CI)			**195**			**151**	**100%**	**–0.14 (–0.23, –0.06)**	

Heterogeneity: χ^2=0.69, *df*=2 (*P*=0.71); I^2=0%
Test for overall effect: *Z*=3.21 (*P*=0.001)

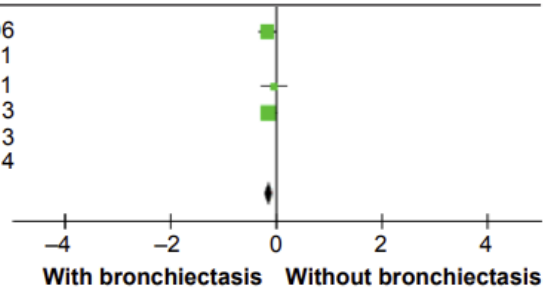

Figure 10 Forest plot of mean difference of albumin in COPD patients with and without bronchiectasis.

High prevalence of bronchiectasis in emphysema-predominant COPD patients

Shuang Dou[1]
Chunyan Zheng[1]
Liwei Cui[1]
Mengshuang Xie[1]
Wei Wang[1]
Hui Tian[1]
Kang Li[1]
Kaidi Liu[1]
Xinyu Tian[1]
Xin Wang[1]
Qun Zhang[1]
Xin Ai[1]
Junchao Che[1]
Qixiao Liu[1]
Haijun Li[2]
Wei Xiao[1]

[1]Department of Pulmonary Medicine, Qilu Hospital, Shandong University, Jinan, People's Republic of China; [2]Department of Cadre Health Care, Qilu Hospital, Shandong University, Jinan, People's Republic of China

Table 2 Comparison between subjects with and without bronchiectasis

Variables	COPD with bronchiectasis, n=140	COPD without bronchiectasis, n=1,599	*P*-value
Blood tests			
ALB, g/L	36.7±5.5	37.7±5.3	0.046[a]
ESR, mm/h	23.1±19.6	24.8±23.6	0.888[a]
Fib, g/L	3.7±1.3	3.6±2.1	0.231[a]

Ni et al. Int Jr COPD 2015
Dou et al. Int Jr COPD 2018

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The effect of the presence and severity of bronchiectasis on the respiratory functions, exercise capacity, dyspnea perception, and quality of life in patients with chronic obstructive pulmonary disease

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Variables	COPD (Group 1) (*n*=245)	COPD + bronchiectasis (Group 2) (*n*=142)	*P*
Age (years)	62 (56-67)	64 (57-71)	0.081
BMI (kg/m^2)	28 (24-31)	25 (21-30)	<0.001*
Males, *n* (%)	179 (73.1)	120 (84.5)	0.009**
Cigarette consumption (pack-year)	50 (30-75)	50 (25-90)	0.727
Previous tuberculosis, *n* (%)	21 (8.5)	30 (21.1)	<0.001**
Emergency admission (*n*/last/year)	1 (0-3)	2 (1-5)	<0.001*
Hospitalization (*n*/last 1 year)	0 (0-1)	1 (0-2)	<0.001*
Positive sputum culture (*Pseudomonas aeruginosa*), *n* (%)	4 (1.63)	17 (11.9)	<0.001**
HAD			
Anxiety	7 (4-10)	7 (4-12)	0.096
Depression	5 (3-9)	7 (4-10)	0.001*

Table 2: Comparison of groups according to the bronchiectasis severity index

Variables	Mild (*n*=20)	Moderate (*n*=46)	Severe (*n*=77)	*P*
HAD				
Anxiety	5 (3-8)	7 (3-11)	10 (6-13)	0.004*
Depression	6 (3-9)	6 (3-9)	8 (5-11)	0.002*

Sahin et al. Ann Thorac Med 2020

High prevalence of bronchiectasis in emphysema-predominant COPD patients

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[1]Department of Pulmonary Medicine, Qilu Hospital, Shandong University, Jinan, People's Republic of China; [2]Department of Cadre Health Care, Qilu Hospital, Shandong University, Jinan, People's Republic of China

Comorbidities

BCO vs COPD

Table 2 Comparison between subjects with and without bronchiectasis

Variables	COPD with bronchiectasis, n=140	COPD without bronchiectasis, n=1,599	*P*-value
Age, years	68.3±9.1	68.6±9.8	0.497[a]
Male, n (%)	102 (72.9)	1,285 (80.4)	0.034[b]
BMI, kg/m^2	23.4±4.0	23.4±4.0	0.872[c]
Smokers, n (%)	96 (68.6)	1,192 (74.5)	0.099[b]
Smoking history, pack-years	29.1±29.1	31.6±30.2	0.369[a]
Blood tests			
ALB, g/L	36.7±5.5	37.7±5.3	0.046[a]
ESR, mm/h	23.1±19.6	24.8±23.6	0.888[a]
Fib, g/L	3.7±1.3	3.6±2.1	0.231[a]
PFT			
FVC, L	2.2±0.8	2.7±0.9	<0.001[a]
FEV_1, L	1.1±0.5	1.5±0.7	<0.001[a]
FEV_1% predicted	41.9±17.9	53.8±22.0	<0.001[a]
FEV_1/FVC%	49.5±12.2	55.4±12.5	<0.001[a]
Comorbidity, n (%)			
Tuberculosis	11 (7.9)	185 (11.6)	0.183[b]
Ischemic heart disease	31 (22.1)	390 (24.4)	0.552[b]
Pulmonary hypertension	9 (6.4)	38 (2.4)	0.005[b]
Hypertension	38 (27.1)	499 (31.2)	0.318[b]
Cor pulmonale	33 (23.6)	257 (16.1)	0.022[b]
Diabetes mellitus	18 (12.9)	147 (9.2)	0.156[b]
%LAA-950	15.0±12.0	13.4±13.4	0.011[a]

Dou et al. Int Jr COPD 2018

Chronic Obstructive Pulmonary Disease Is Associated With Decreased Quality of Life in Bronchiectasis Patients: Findings From the KMBARC Registry

Sang Hyuk Kim[1], Changhwan Kim[2], Ina Jeong[3], Seung Jun Lee[4], Tae Hyung Kim[5], Chang Youl Lee[6], Yeon-Mok Oh[7], Hyun Lee[5†] and Youlim Kim[6*†] on behalf of the KMBARC*

Comorbidities

BCO vs Bronchiectasis

TABLE 1 | Clinical characteristics of the study population according to COPD status.

	Without COPD ($n = 372$)	With COPD ($n = 226$)	*p*-value
Age, years	65 (60–71)	67 (60–72)	0.025
Male, *n* (%)	130 (34.9)	134 (59.3)	<0.001
BMI, kg/m^2 ($n = 562$)	23 (21–25)	23 (21–26)	0.283
Current or ex-smoker, *n* (%)	99 (26.6)	112 (49.6)	<0.001
Comorbidities			
Asthma, *n* (%)	69 (18.5)	65 (28.8)	0.005
Cardiovascular disease, *n* (%)	92 (24.7)	86 (38.1)	<0.001
Diabetes mellitus, *n* (%) ($n = 597$)	48 (12.9)	25 (11.1)	0.604
Rhinosinusitis, *n* (%)	33 (8.9)	20 (8.8)	1.000
Neoplastic disease, *n* (%) ($n = 594$)	31 (8.4)	23 (10.2)	0.547
Tuberculosis, *n* (%) ($n = 597$)	102 (27.4)	96 (42.7)	<0.001

Kim et al. Frontiers in Med 2021

Why is the overlap between COPD and bronchiectasis important?

- Prognosis
- Investigation and Assessment
- Management
  - education
  - smoking cessation advice
  - teaching of self-management principles
  - pneumococcal and influenza vaccination
  - referral for pulmonary rehabilitation in those with symptomatic breathlessness
  - mucolytics

Differences in management recommendations between Bronchiectasis and COPD

	Bronchiectasis	COPD
Chest physiotherapy	Chest physiotherapy for airway clearance (independent techniques, device-dependent techniques and adjuncts to assist techniques[3]	Chest physiotherapy is primarily focused on pulmonary rehabilitation[2]
ICS	Guidelines recommend against inhaled steroids, and there are concerns there may be an excess risk of pneumonia with these beyond that seen in COPD[3,5]	In certain eosinophilic phenotypes, inhaled corticosteroids, in addition to long-acting bronchodilators, are recommended.[2,4] There is increasing evidence in selecting the phenotypes that respond to inhaled steroids. This is to reduce the risk of pneumonia
Sputum clearance	Hypertonic saline (7%) can be used to aid sputum clearance[3]	Normal saline (0.9%) may be used in practice to aid sputum expectoration, especially in acute exacerbation
Antibiotics	Antibiotics for infective exacerbation are recommended to be 14 d[3,5]	Antibiotic therapy for infective exacerbation is recommended at 5–7 d[2]
	Inhaled nebulized antibiotics for patients with frequent exacerbations[3]	Inhaled nebulized antibiotics are *not* recommended for *Pseudomonas* eradication[2]
Lung T	Lung transplantation rarely indicated (<10% of all transplants)[7,51]	Lung transplantation common (27% of all lung transplants)[2,4]
Macrolide	Long-term macrolide treatment is advised to reduce exacerbation rate of 3 or more per year	Long term macrolude treatment is advised to reduce exacerbation rate in those with more than 3 exacerbations and at least 1 hospital admission

Sobala et al. Clin Chest Med 2022

SUMMARY

- COPD and bronchiectasis, commonly overlap
  - Spirometric criteria for COPD, radiologic criteria for bronchiectasis

- COPD and bronchiectasis overlap
  - Poorer clinical outcomes and higher mortality
  - Higher exacerbation rates, worse airway obstruction, increased sputum production, higher inflammatory biomarkers, chronic colonization by potentially pathogenic microorganisms, quality of life, 6MWT, dyspnea, and psychological impact

- Common investigation and treatments between two disease but there are also key differences.
- Choice among the different investigation and treatment would depend on advantages and disadvantages.

YONSEI UNIVERSITY
COLLEGE OF MEDICINE

Characteristics and related factors of bronchiectasis in chronic obstructive pulmonary disease

Qihong Yu, MD[a], Haiying Peng, MD[a], Bo Li, MD[a], Hongyu Qian, MD[a], Hong Zhang, MD[b,*]

Isolation of pathogenic microorganisms in COPD group and COPD group with bronchiectasis.

	COPD group (N = 90)	COPD with bronchiectasis group (N = 43)	*P*
Klebsiella pneumoniae	5	1	<.001
Pseudomonas aeruginosa	0	6	
Acinetobacter baumannii	3	2	
Stenotrophomonas maltophili	3	0	
Haemophilus influenzae	0	1	
Other	6	6	

Yu et al. Medicine 2019

Characteristics and related factors of bronchiectasis in chronic obstructive pulmonary disease

Qihong Yu, MD[a], Haiying Peng, MD[a], Bo Li, MD[a], Hongyu Qian, MD[a], Hong Zhang, MD[b,*]

General data and clinical features of COPD group and COPD with bronchiectasis group.

	COPD group (N=90)	COPD with bronchiectasis group (N=43)	P
Sex male (%)	60 (66.67)	23 (53.49%)	.142
Age (yr)	69.78±8.24	71.02±8.47	.42
Smoking history (package - year)	40 (40)	30 (27)	.125
Age of onset (age)	55.04±14.99	51.16±13.74	.154
Medical history (years)	10 (15)	20 (20)	.027
Past tuberculosis history (number)	6	5	.331
The number of patients hospitalized in the previous year	19	17	.025
hospital stay (day)	11.56±4.06	12.86±5.07	.113
Sputum multi-phlegm (%)	45 (50%)	21 (48.8%)	.513

Microbial and functional characteristics of COPD group and COPD with bronchiectasis group.

	COPD group (N=90)	COPD with bronchiectasis group (N=43)	P
leukocyte (*109/L)	8.15±3.51	8.73±3.75	.385
fibrinogen (mg/dL)	3.86±1.43	4.02±1.36	.549
C reactive protein (IU/mL)	0.72 (2.14)	1.14 (1.76)	.172
Albumin (mg/dL)	37.98±3.80	38.35±3.96	.608
FEV percentage of forecast (%)	39.09±10.92	35.45±10.19	.069
FEV/FVC%	42.03±9.47	39.92±9.01	.225
Combined pulmonary hypertension (N)	36	17	.852
Combined respiratory failure (N)	27	12	.804
At least one potential pathogen was isolated	17	16	.022

Yu et al. Medicine 2019

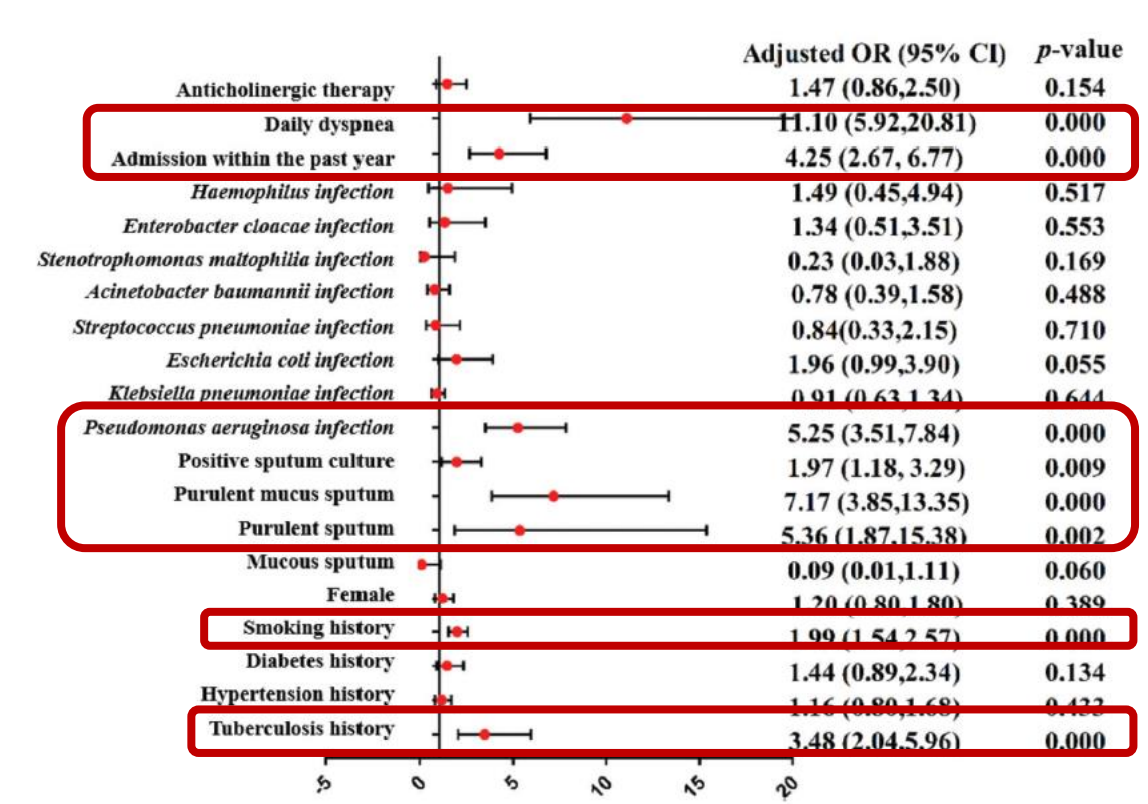
Risk factors for bronchiectasis in patients with chronic obstructive pulmonary disease: a systematic review and meta-analysis

XinXin Zhang,[I] LiJian Pang,[II] XiaoDong Lv,[I,*] HaoYang Zhang[I]

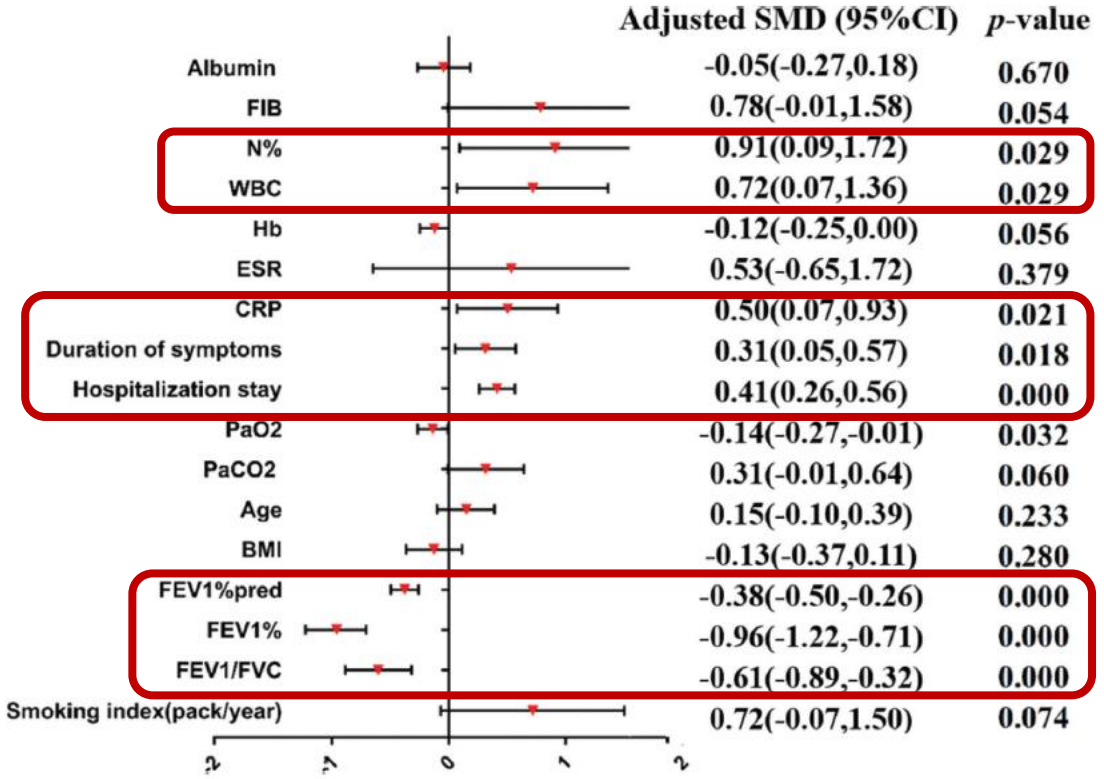
[I]Liaoning University of Traditional Chinese Medicine, Shenyang, China. [II]Liaoning University of Traditional Chinese Medicine Affiliated Hospital, Shenyang, China.

Characteristics

BCO vs COPD



Forest-plot of the binary variable index (OR). CI, confidence interval; OR, odds ratio



Forest-plot of the continuous variable index (SMD)

Zhang et al. Clinics 2021