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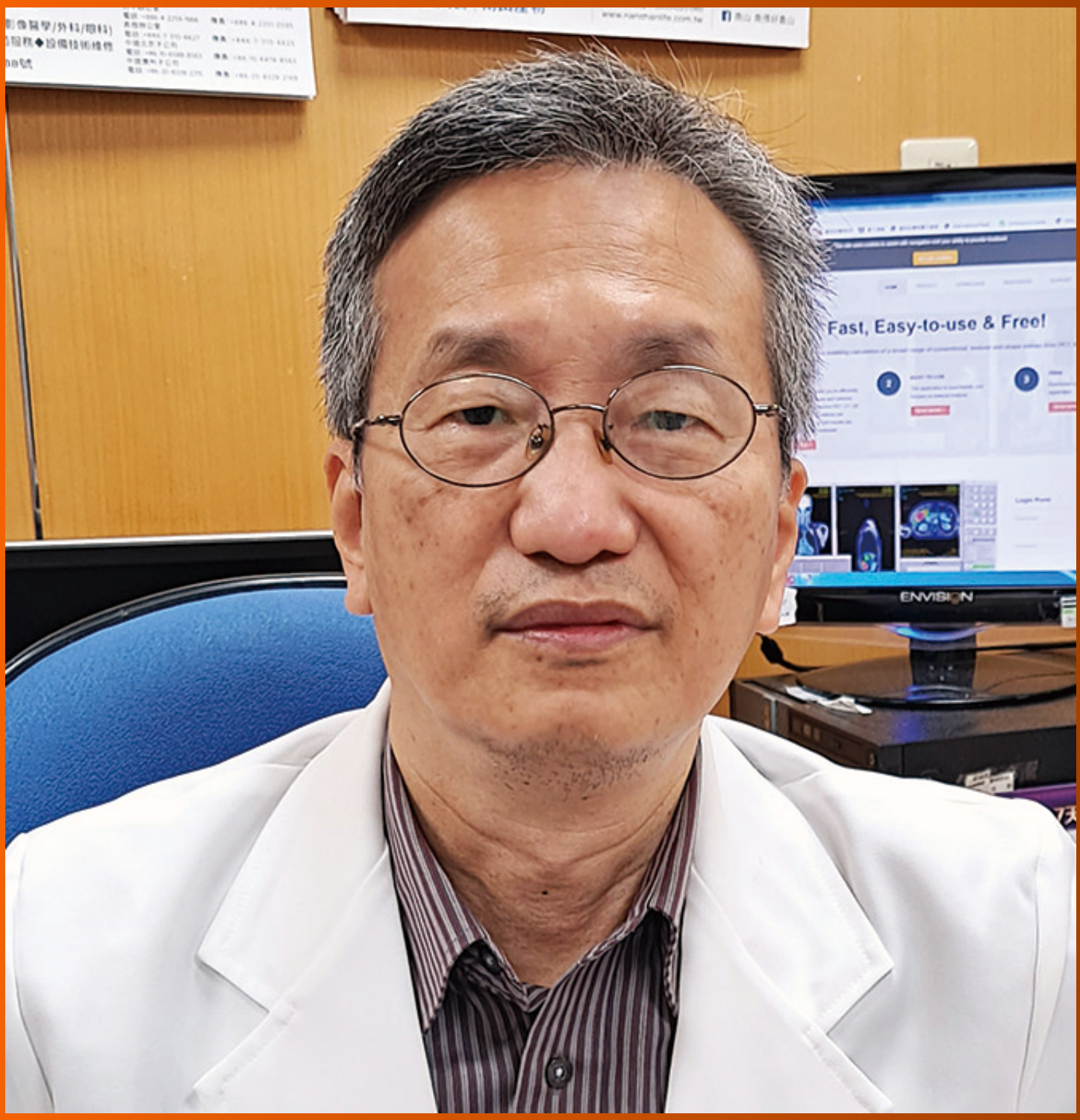

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CASE REPORT

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ABOUT COVER

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AIMS AND SCOPE

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WJCC mainly publishes articles reporting research results and findings obtained in the field of clinical medicine and covering a wide range of topics, including case control studies, retrospective cohort studies, retrospective studies, clinical trials studies, observational studies, prospective studies, randomized controlled trials, randomized clinical trials, systematic reviews, meta-analysis, and case reports.

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The *WJCC* is now indexed in Science Citation Index Expanded (also known as SciSearch®), Journal Citation Reports/Science Edition, Scopus, PubMed, and PubMed Central. The 2021 Edition of Journal Citation Reports® cites the 2020 impact factor (IF) for *WJCC* as 1.337; IF without journal self cites: 1.301; 5-year IF: 1.742; Journal Citation Indicator: 0.33; Ranking: 119 among 169 journals in medicine, general and internal; and Quartile category: Q3. The *WJCC*'s CiteScore for 2020 is 0.8 and Scopus CiteScore rank 2020: General Medicine is 493/793.

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META-ANALYSIS

Association of chronic obstructive pulmonary disease with mild cognitive impairment and dementia risk: A systematic review and meta-analysis

Li-Ying Zhao, Xue-Lai Zhou

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Abstract

BACKGROUND

Chronic obstructive pulmonary disease (COPD) is a common public health issue that has been linked to cognitive dysfunction.

AIM

To investigate the relationship between COPD and a risk of mild cognitive impairment (MCI) and dementia.

METHODS

A comprehensive literature search of the PubMed, Embase, Google Scholar, and Cochrane Library electronic databases was conducted. Pooled odds ratios (OR) and mean differences (MD) with 95% confidence intervals (CIs) were calculated using a random or fixed effects model. Studies that met the inclusion criteria were assessed for quality using the Newcastle Ottawa Scale.

RESULTS

Twenty-seven studies met all the inclusion criteria. Meta-analysis yielded a strong association between COPD and increased risk of MCI incidence (OR = 2.11, 95%CI: 1.32-3.38). It also revealed a borderline trend for an increased dementia risk in COPD patients (OR = 1.16, 95%CI: 0.98-1.37). Pooled hazard ratios (HR) using adjusted confounders also showed a higher incidence of MCI (HR = 1.22, 95%CI: -1.18 to -1.27) and dementia (HR = 1.32, 95%CI: -1.22 to -1.43) in COPD patients. A significant lower mini-mental state examination score in COPD patients was noted (MD = -1.68, 95%CI: -2.66 to -0.71).

CONCLUSION

Our findings revealed an elevated risk for the occurrence of MCI and dementia in COPD patients. Proper clinical management and attention are required to prevent and control MCI and dementia incidence in COPD patients.

Key Words: Mild cognitive impairment; Chronic obstructive pulmonary disease; Dementia; Meta-analysis

Core Tip: Chronic obstructive pulmonary disease (COPD) is a common public health issue that has been linked to cognitive dysfunction. The current meta-analysis was performed to investigate the relationship between COPD and mild cognitive impairment (MCI) and dementia risk. Twenty-seven studies met all the inclusion criteria. Meta-analysis yielded a strong association between COPD and an increased risk of MCI incidence (odds ratio = 2.11, 95% confidence interval: 1.32-3.38). Our findings revealed an elevated risk for the occurrence of MCI and dementia in COPD patients. Proper clinical management and attention are required to prevent and control MCI and dementia incidence in COPD patients.

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INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a progressive multicomponent lung disease that occurs more commonly in the elderly[1]. It is characterised by a partially irreversible chronic obstruction of lung airflow resulting in an abnormal decrease in blood oxygen levels, potentially leading to cognitive dysfunction[2]. Various studies have estimated that the prevalence of cognitive impairment in COPD patients ranges from 16% to 57%[3,4]. A prior review of 17 individual studies by Yohannes *et al* [5] showed that 32% of COPD patients showed some signs of cognitive dysfunction, with no less than 25% of patients showing at least mild cognitive impairment (MCI).

Cognitive impairment in COPD patients may compromise their capability to self-care and adhere to treatment regimens, making the relationship between COPD and cognitive impairment important for devising therapeutic approaches for COPD[6,7]. Some studies have focused on the relationship between COPD and neurologic function, but with inconsistent conclusions[8]. Data based on the Atherosclerosis Risk in Communities study showed that reduced lung function was associated with poor cognitive performance and higher risk of dementia hospitalization[9]. Data based on Taiwanese National Health Insurance Research Database showed that COPD patients exhibited a 1.27-fold higher risk of developing dementia[10].

To our knowledge, there has only been one published meta-analysis investigating the statistical association of COPD with cognition dysfunction. Zhang *et al*[11] concluded that COPD patients had an elevated risk of cognitive dysfunction. Similarly, only one single meta-analysis has looked at the relationship between COPD and dementia. Pooling data from three studies, Wang *et al*[12] showed that COPD patients faced a higher risk of developing dementia. However, these important clinical questions have not been investigated in a more thorough and conclusive manner. As such, we conducted a comprehensive systematic review and meta-analysis to investigate the association between COPD and the risk of MCI and dementia.

MATERIALS AND METHODS

Search strategy

Our meta-analysis was performed according to the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) guidelines[13]. We conducted a comprehensive search using PubMed, Embase, Google Scholar, and Cochrane Library online databases for articles published prior to March 31, 2021. The following key terms were used: "Chronic Obstructive Pulmonary Disease" OR "COPD" OR "Chronic Obstructive Airway Disease" OR "COAD" AND "Mild Cognitive impairment" OR "MCI" OR "Cognitive dysfunction" OR "Cognitive decline" AND "Dementia". Studies cited by articles that met the inclusion criteria were manually searched to identify additional eligible studies. Study eligibility

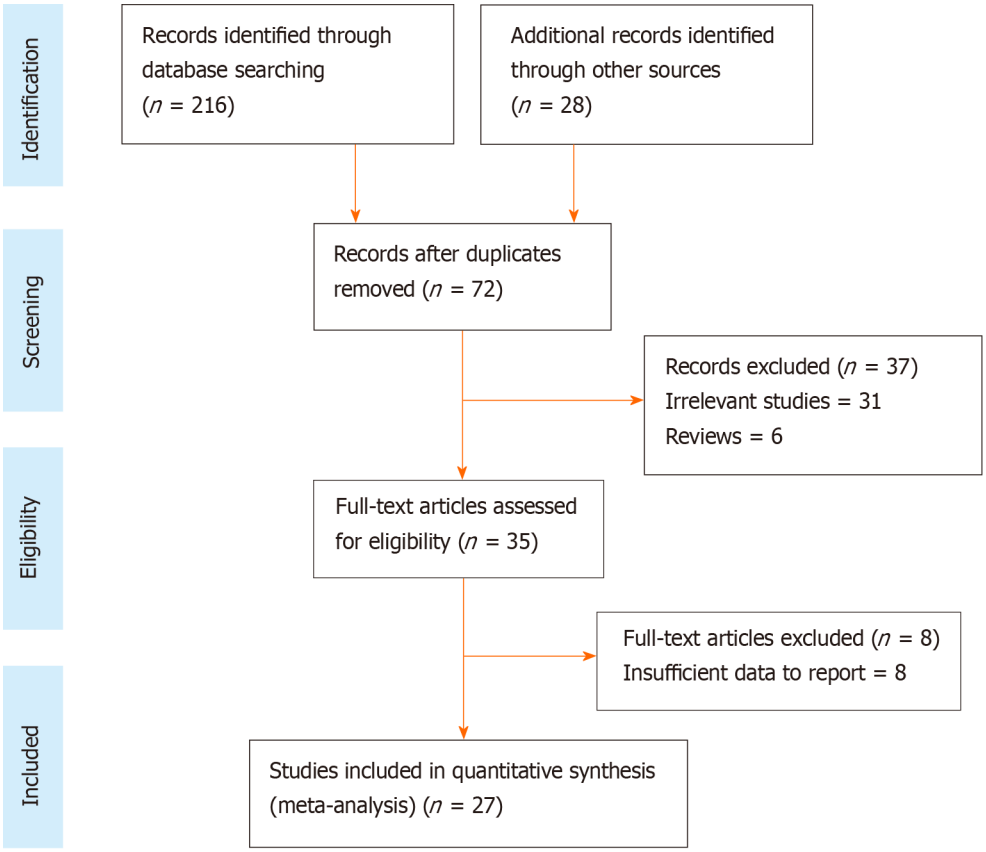

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Figure 1 Flow diagram for study selection.

was not restricted based on language, sex, or publication year. Systematic reviews, conference abstracts, and editorials were excluded due to insufficient data presentation details.

Eligibility criteria

Inclusion criteria: We included studies that: (1) Investigated the association between COPD and a risk of MCI or dementia; (2) adopted a definite outcome of cognitive impairment or dementia in COPD and non-COPD subjects; (3) reported raw values necessary to calculate odds ratios (OR) or hazard ratios (HRs) for the incidence of cognitive impairment or dementia; (4) contained case controls, were prospective or retrospective-cohort, or had a cross-sectional design; and (5) compared the association between COPD and non-COPD patients.

Exclusion criteria: We excluded studies that: (1) Did not report relevant outcomes; or (2) were full-text inaccessible.

Data collection and analysis

All eligible studies were separately screened by two reviewers to determine whether they met the inclusion criteria. Screening was first conducted at the abstract content level, with relevant studies further investigated at the full-text level. Articles published in languages other than English were machine-translated using Google Translate, with the translated version reviewed. The following information was extracted from the included studies for summarization and analysis: Author, year, study design type, group investigated, sample size, diagnostic criteria for COPD, adjusted confounder for calculating pooled ratio, MCI prevalence, dementia prevalence, and scales used for cognitive assessment.

Quality assessment

Study quality was assessed independently by two separate reviewers using the Newcastle-Ottawa Scale (NOS)[14], which examined three components: Selection, comparability, and ascertainment of outcome. Disagreements were resolved through discussion.

Publication bias

Publication bias was assessed using Funnel plot analysis and Egger's regression test[15,16].

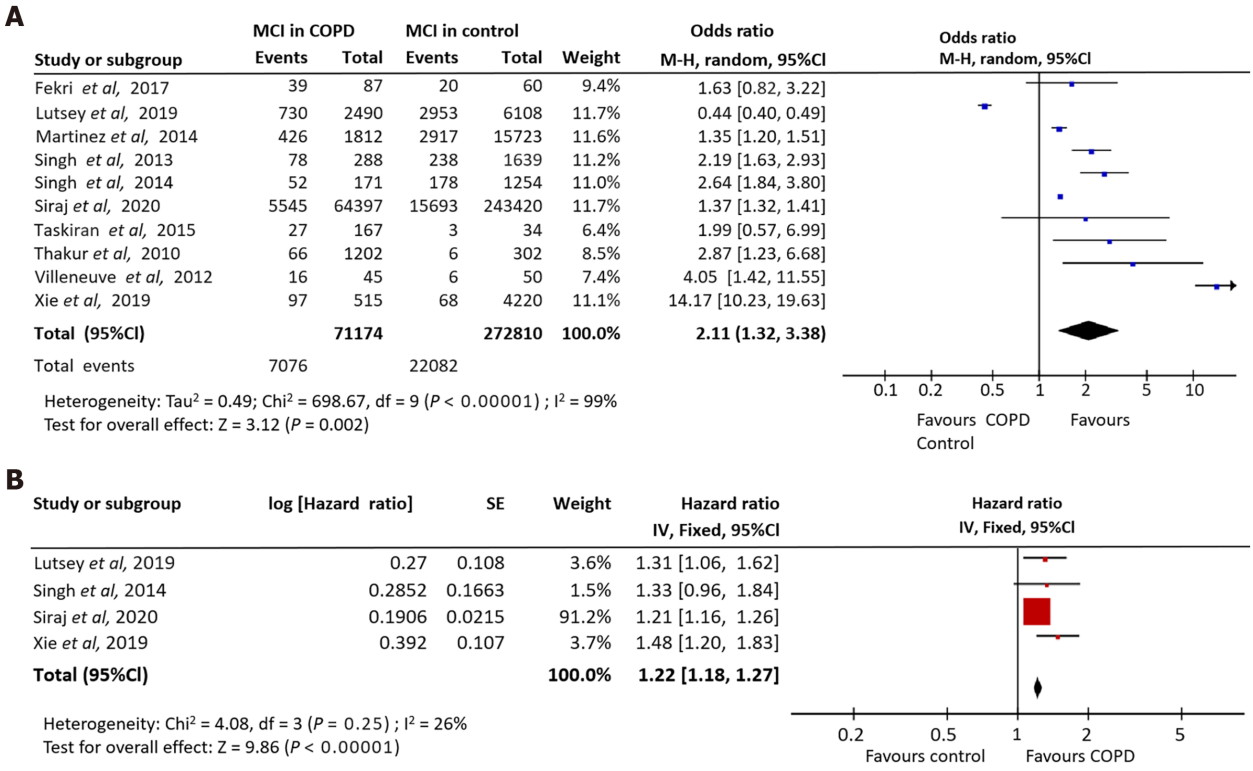

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Figure 2 Forest plot examining the association of chronic obstructive pulmonary disease with mild cognitive impairment risk. A: Odds ratios; B: Hazard ratios.

Statistical analysis

Mean differences (MDs) with 95% confidence intervals (CIs) were calculated for continuous outcomes. For categorical outcomes, ORs and HRs with 95%CIs were calculated to estimate pooled findings. Heterogeneity between studies (measurable heterogeneity) was evaluated using I^2 statistics. If I^2 values > 50%, a random-effects model was applied, otherwise a fixed-effect model was applied. Statistical analyses were performed using Review Manager software (Version 5.3, Copenhagen: The Nordic Cochrane Centre, The Cochrane Collaboration 2014).

RESULTS

Literature search

Preliminary screening of PubMed, Embase, Google Scholar, and Cochrane Library databases yielded 234 results (Figure 1). Review of article title and abstract resulted in 72 remaining studies. Full-text review further excluded 45, leaving 27 studies[3,4,10,17-40] that were ultimately included in the meta-analysis.

Properties and characteristics of included studies

Relevant study data, including the diagnostic criteria for COPD, sample size, and disease assessment scales for all the 27 included studies[3,4,10,17-40] are shown in Table 1. The included studies were published between 1996 and 2020, and study sample sizes ranged from 20 to 243420 subjects. Ten studies[17,19-22,28,29,34,35,39] were case-controlled, ten were cross-sectional[3,4,24-26,32,36-38,40], four were prospective-cohort[18,27,30,31], and three were retrospective-cohort[10,23,33]. Seventeen studies[4,17-22,25,31,32,34-40] reported cognitive impairment data based on the mini-mental state examination (MMSE) scoring system. Twenty-two studies used the GOLD criteria, three[10,23,33] reported the ICD-9 CM criteria, and two[3,26] followed the standardized guidelines for COPD diagnosis. The quality score was high in twelve studies, medium in seven, and low in six (Supplementary Table 1). The assessment criteria involving the NOS uses three broad criteria: Selection, comparability, and exposure, where the selection defines and analyses the cases and control subjects included in the study, comparability defines the matching or comparison of cases and control subjects for better empirical investigation, and exposure determines whether the study was conducted in a blinded or unbiased manner along with the response of the subjects.

Table 1 Baseline and clinical characteristics of included studies

No.	Ref.	Country or region	Study design	Groups investigated	Age	Diagnostic criteria	Assessment scales	Adjusted variables	MCI (%)	Dementia (%)	NOS quality score
1	Mermit Çilingir *et al*[17], 2020	Turkey	Case Control	COPD-E (*n* = 30); COPD-S (*n* = 54); Control (*n* = 37)	COPD-E-71.8 ± 12.3; COPD-S- 62 ± 10.2; Control-65.9 ± 12.8	GOLD	MMSE; RCS	NA	NA	NA	7
2	Xie *et al*[18], 2019	China	Prospective Cohort	COPD (*n* = 515); No COPD (*n* = 4220)	COPD-82.9 ± 9.7	GOLD	MMSE	Age, gender, marital status, education level, alcohol drinking, current exercise, BMI, baseline prevalence of HTN, DM, and stroke	18.8; 14.6	2.9; 1.6	8
3	Samareh Fekri *et al*[19], 2017	Iran	Case Control	COPD (*n* = 87); Control (*n* = 60)	COPD-60.4 ± 9.8; Control-58.1 ± 9.8	GOLD	MMSE	Age and sex	51.7; 36.6	NA	7
4	Gupta *et al*[20], 2013	India	Case Control	COPD-(*n* = 40); Control (*n* = 40)	COPD-57.2 ± 9.1; Control-56.9 ± 9.2	GOLD	MMSE	Age	NA	NA	5
5	Li *et al*[21], 2013	China	Case Control	Mild COPD-(*n* = 27); Severe COPD-(*n* = 35); Control (*n* = 27)	Mild COPD-70.4 ± 7.7; Severe COPD-68.2 ± 7.8; Control-66.2 ± 7.1	GOLD	MMSE	Age, sex, education level, BMI, smoking status, and CVD	NA	NA	6
6	Li *et al*[22], 2013	China	Case Control	Mild COPD-(*n* = 37); Severe COPD-(*n* = 48); Control (*n* = 37)	Mild COPD-69.2 ± 8.1; Severe COPD-67.6 ± 7.6; Control-66.5 ± 6.9	GOLD	MMSE	Age, sex, education level, BMI, smoking status, and CVD	NA	NA	8
7	Liao *et al*[23], 2015	Taiwan	Retrospective Cohort	COPD (*n* = 20492); No COPD (*n* = 40765)	COPD-68.2 ± 12.4; No COPD-67 ± 12.5	ICD-9CM	NA	Age and sex	NA	13.29.11	**7**
8	Martinez *et al* [24], 2014	Michigan	Cross-sectional	COPD (*n* = 1812); No COPD (*n* = 15723)	COPD-70.3 ± 9.0; No COPD-68.7 ± 9.9	GOLD	ADL	Baseline cognition	16.5; 12.4	3.9; 3.1	8
9	Dal Negro *et al* [25], 2015	Italy	Cross-sectional	COPD with LTOT (*n* = 73); COPD without LTOT (*n* = 73)	COPD with LTOT-70.9 ± 8.9; No COPD with LTOT-71.2 ± 9.1	GOLD	MMSEMRC; CAT	Age, gender, smoking history, BMI, dyspnoea score, ABG, and lung function	32.8	NA	6
10	Singh *et al*[26], 2013	United States	Cross-sectional	COPD (*n* = 288); No COPD (*n* = 1639)	MCI-82.7 ± 11.2; Normal Cognition-79.7 ± 12.5	Standard criteria	BDI; CDR	BDI-II Depression, history of stroke, APOEe4 genotype, DM, HTN, CAD, and BMI	14.6; 27.1	NA	7
11	Singh *et al*[3], 2014	United States	Cross-sectional	Total COPD (*n* = 1425); COPD (*n* = 171); No COPD (*n* = 1254)	COPD-80.8 ± 7.5; No COPD-79.1 ± 7.5	Standard criteria	BDI	BDI-II depression, history of stroke, APOEe4 genotype, smoking, DM, HTN, CAD, z-scores, and BMI	NA	NA	7

12	Lutsey *et al*[27], 2019	United States	Prospective Cohort	COPD (n = 2490); No COPD (n = 6108)	COPD-55.1 ± 5.8; No COPD-53.9 ± 5.7	GOLD	NA	Age, sex, education level, race, center, cigarette smoking and pack-years of smoking, physical activity, BMI, systolic BP, BP medication use, diabetes, HDL, LDL lipid-lowering medications, CAD, heart failure, stroke, apolipoprotein E genotype, and fibrinogen	NA	NA	6
13	Siraj *et al*[28], 2020	United Kingdom	Case Control	COPD (n = 64397); No COPD (n = 243420)	COPD-66.4 ± 10.9; No COPD-65.7 ± 11	Standard criteria	NA	Age, sex, GP, BMI, smoking status, modified CCI, CV disease, corticosteroid use, and socioeconomic class	NA	NA	7
14	Villeneuve *et al* [29], 2012	Canada	Case Control	Total COPD (n = 45); Control (n = 50)	COPD-68.4 ± 8.7; Control-67.4 ± 8.7	GOLD	MMSE; MoCA	Age and education	36.0; 12.0	NA	5
15	Yeh *et al*[30], 2018	Taiwan	Prospective Cohort	COPD (n = 10260); No COPD (n = 20513)	COPD-65.6 ± 11.8; No COPD-65.5 ± 11.9	GOLD	NA	Age, sex, each comorbidity, inhaled corticosteroid, and oral steroids	NA	11.1; 8.81	4
16	Ozge *et al*[31], 2006	Turkey	Prospective cohort	COPD (n = 54); Control (n = 24)	COPD-64.6 ± 8.5; Control-62.4 ± 8.4	GOLD	MMSE,BDS, CDR, IADL	Age and sex	NA	NA	6
17	Favalli *et al*[32], 2008	Turkey	Cross-sectional	COPD (n = 21); Control (n = 20)	COPD-74.6 ± 5.4; Control-73.7 ± 4.5	GOLD	MMSE; GDS	NA	NA	NA	5
18	Liao *et al*[10], 2015	Taiwan	Retrospective Cohort	COPD (n = 8640); No COPD (n = 17280)	COPD-68.7 ± 10.7; No COPD-68.7 ± 10.7	ICD-9CM	Self-administered questionnaire	Age and sex	NA	5.22; 7.06	6
19	Thakur *et al*[33], 2010	United States	Retrospective Cohort	COPD (n = 1202); Control (n = 302)	COPD-58.2 ± 6.2; Control-58.5 ± 6.2	ICD-9CM	MRC; BODE index; MMSE	Age, sex, race, educational attainment, and smoking history	5.5; 2.0	NA	7
20	Zhou *et al*[34], 2012	China	Case Control	COPD (n = 110); Control (n = 110)	COPD-80.9 ± 1.7; Control-80.8 ± 1.5	GOLD	CDR; MMSE	Age and education	NA	NA	6
21	Dodd *et al*[4], 2013	United Kingdom	Cross-sectional	COPD-E (n = 30); COPD-S (n = 50); Control (n = 30)	COPD-E-70 ± 11; COPD-S-69 ± 8; Control-65 ± 8	GOLD	MMSE	Age	NA	NA	7
22	Isoaho *et al*[35], 1996	Finland	Case Control	COPD (n = 81); Control (n = 245)	COPD-70.4 ± 4.8; Control-71.3 ± 5.9	GOLD	MMSE	Age and sex	17.0; 13.0	7.1; 3.2	6
23	Lima *et al*[36], 2007	Brazil	Cross-sectional	COPD (n = 30); Control (n = 34)	COPD-65 ± 8; Control-66 ± 8	GOLD	MMSE; DSM-IV	NA	NA	NA	5
24	Ozyemisci-Taskiran *et al* [37], 2015	Turkey	Cross-sectional	COPD-E (n = 133); COPD-S (n = 34); Control (n = 34)	COPD-E-69.3 ± 8.9; COPD-S-67.5 ± 8.9; Control-68.3 ± 8.8	GOLD	MMSE; HAD; BODE	Age and sex	22.6	NA	6
25	Salik *et al*[38], 2007	Turkey	Cross-sectional	COPD (n = 32); Control (n = 26)	COPD-66.7 ± 2.5; Control-65.7 ± 7.3	GOLD	MMSE; MCS	NA	NA	NA	5
26	Sarınç Ulaşlı *et al* [39], 2013	Turkey	Case Control	COPD (n = 112); Control (n = 44)	COPD-65 ± 7.6; Control-64 ± 9	GOLD	MMSE	Age and sex	NA	NA	5

27	Tomruk *et al* [40], 2015	Turkey	Cross-sectional	COPD (n = 35); Control (n = 36)	COPD-62.9 ± 6.3; Control-60.8 ± 6.2	GOLD	MMSE	Age	NA	NA	4

COPD: Chronic obstructive pulmonary disease; S: Stable; E: Exacerbation; GOLD: Global Initiative for Chronic Obstructive Lung Disease; CAT: COPD Assessment Test; MMSE: Mini-Mental State Examination; COPD: Chronic obstructive pulmonary disease; LTOT: Long-term oxygen treatment; HAD: Hospital Anxiety and Depression; BODE: (B) BMI, (O) the severity of airflow obstruction (FEV1), (D) severity of dyspnea (modified Medical Research Council Dyspnea Scale), (E) exercise capacity; ICD-9CM: International Classification of Diseases, Ninth Revision, Clinical Modification; BDI: Beck Depression Inventory; IADL: Instrumental activities of daily living scale; CDR: Clinical dementia rating; BMI: Body mass index; CVD: Cardiovascular Disease; GP: General practice; DM: Diabetes mellitus; ABG: Arterial blood gas; HTN: Hypertension; CAD: Coronary artery disease; HDL: High Density lipoprotein; LDL: Low density lipoprotein; NA: Not applied.

Association of COPD with MCI risk

Ten studies[3,18,19,24,26-29,33,37] detailing 71174 COPD patients and 22082 control subjects investigated the association of COPD with MCI risk. Our meta-analysis indicated a strong association between COPD and an increased MCI incidence risk (OR = 2.11, 95%CI: 1.32-3.38). A significant degree of heterogeneity was observed (I^2 = 99%). Using a random effects model, we demonstrated that COPD patients were 1.26 times more susceptible to MCI compared to non-COPD controls (Figure 2A).

Adjusted HRs for MCI risk in COPD patients

Pooling adjusted HRs from four studies[3,18,27,28] investigating the relationship between COPD and MCI incidence revealed a significant association (HR = 1.22, 95%CI: -1.18 to -1.27; I^2 = 26%] (Figure 2B).

Association of COPD with risk of dementia

Seven studies[10,18,23,24,27,28,30] involving 108606 COPD patients and 347939 control subjects, investigated the relationship between COPD and dementia risk. Pooling these data showed a borderline trend for an increased dementia risk in COPD patients compared to non-COPD control patients (OR = 1.16, 95%CI: 0.98-1.37). A high degree of heterogeneity was observed (I^2 = 94%). Our meta-analysis showed that COPD patients were more susceptible to dementia (Figure 3A).

Adjusted HRs for dementia risk in COPD patients

Pooling adjusted HRs from six studies[10,18,23,27,28,30] investigating the relationship between COPD and dementia incidence revealed a significant association (HR = 1.32, 95%CI: -1.22 to -1.43; I^2: 99%) (Figure 3B).

MMSE score in COPD and non-COPD patients

Seventeen studies[4,17-22,32,35-40,25,31,34] involving 1392 COPD patients and 5097 control subjects, reported mean MMSE score data for both COPD and non-COPD patients. Pooling these results showed a significant lower MMSE score in COPD patients compared to controls (MD = -1.68, 95%CI: -2.66 to -0.71] (Figure 4). A high degree of heterogeneity among these seventeen studies was observed (I^2 = 96%).

Publication bias

Egger's tests did not show any significant publication bias for the examined comparisons. Figure 5 shows the funnel plot of the studies included in each comparison. However, no significant publication

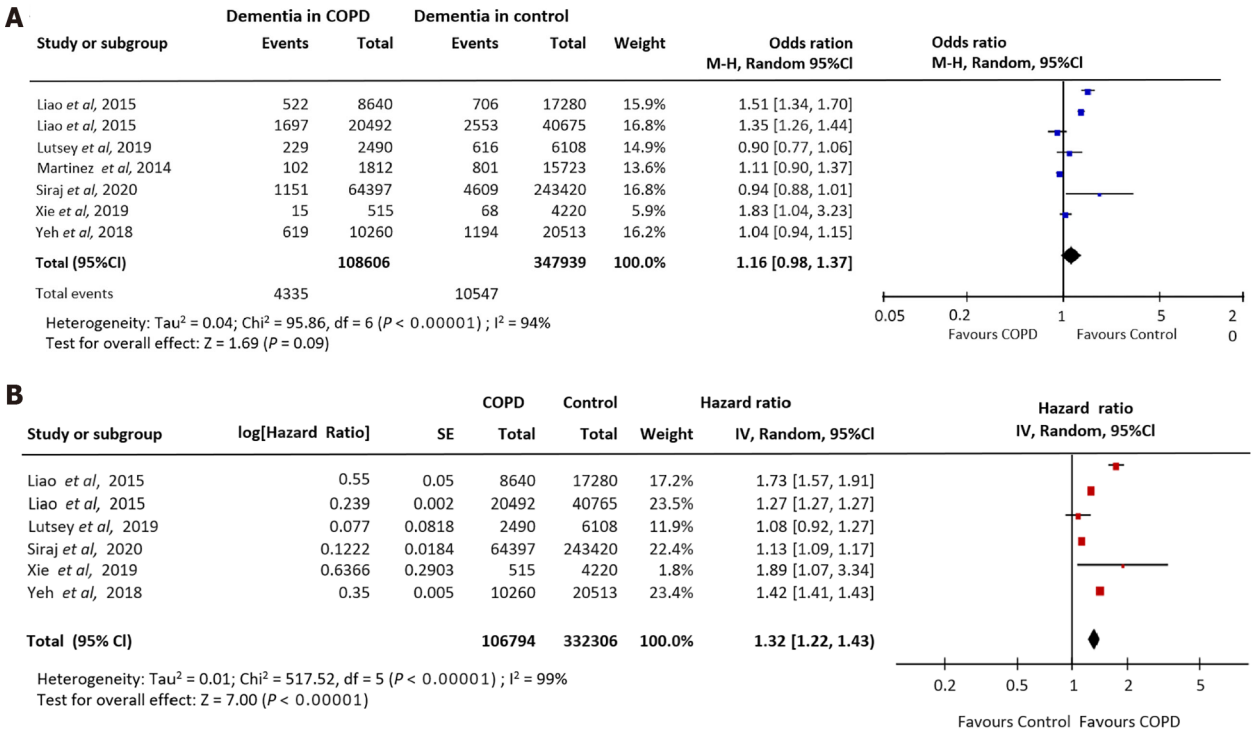

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Figure 3 Forest plot examining the association of chronic obstructive pulmonary disease with dementia risk. A: Odds ratios; B: Hazard ratios.

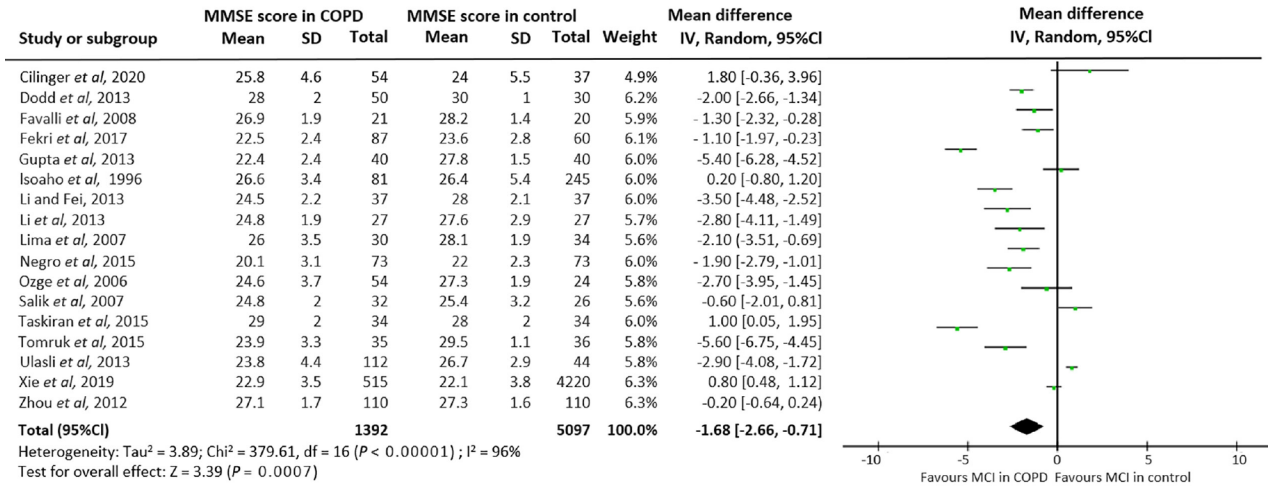

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Figure 4 Forest plot examining mini-mental state examination score differences between chronic obstructive pulmonary disease and control groups.

biases were observed for the association of COPD with risk of MCI and dementia, MCI risk in COPD patients, dementia risk in COPD patients, and comparison of MMSE score between the COPD and control groups.

DISCUSSION

This study is the first systematic review and meta-analysis examining the association between COPD and the risk of MCI and dementia. We found that patients with COPD are 2.11 times more susceptible to MCI and 1.16 times more susceptible to dementia. Moreover, lower MMSE scores were observed in COPD patients, indicating greater cognitive impairment.

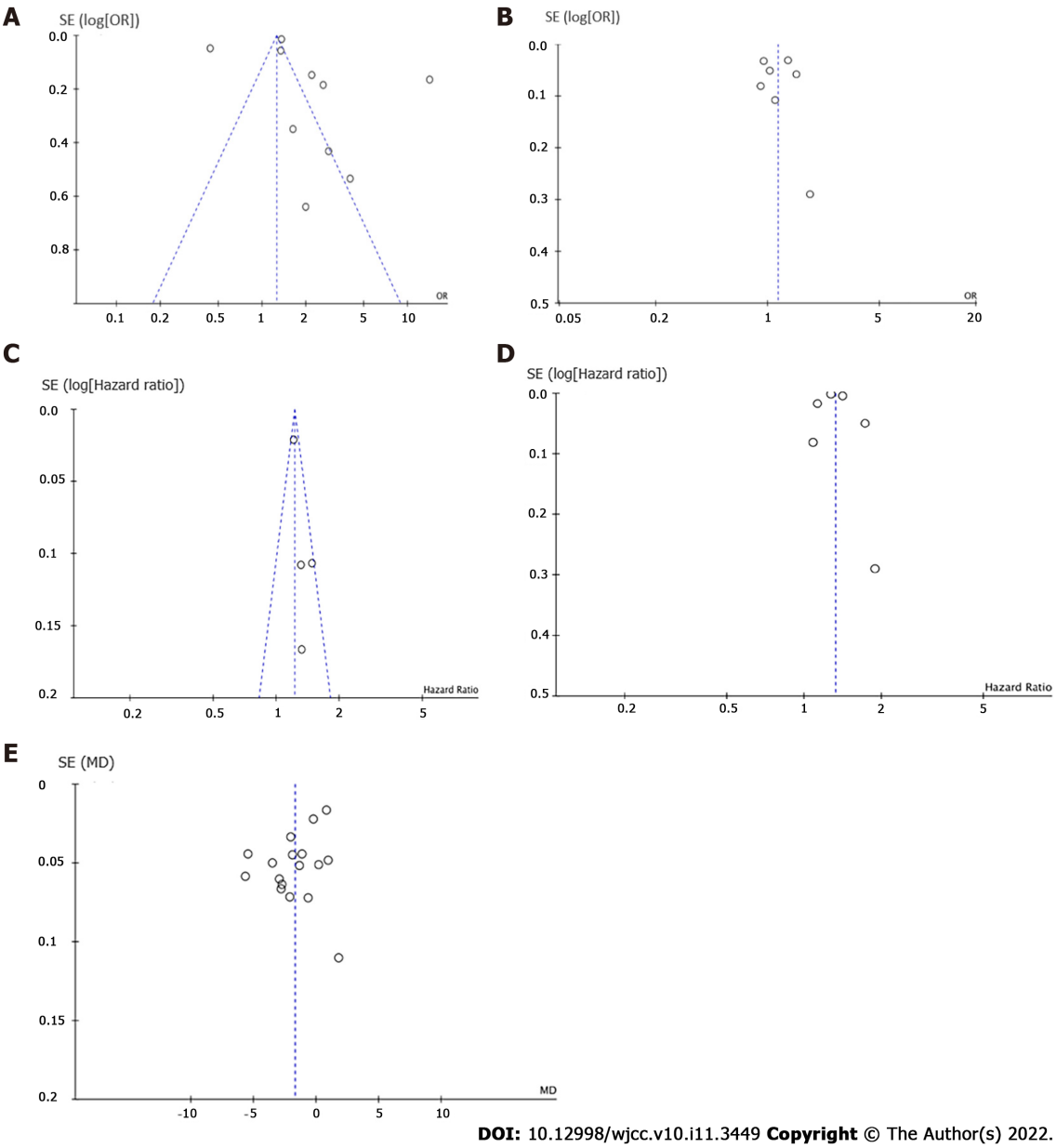

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Figure 5 Funnel plot. A: Mild cognitive impairment (MCI); B: Dementia; C: MCI risk in chronic obstructive pulmonary disease (COPD) patients; D: Dementia risk in COPD patients; E: Comparison of mini-mental state examination score between COPD and control groups.

COPD-associated neurological impairment and dementia put a great burden on the patients and the healthcare system. In particular, declining cognition leads to COPD patients requiring more assistance for daily activities[41]. Our analysis was performed based on the reported adjustments within individual studies for confounding factors such as age, sex, smoking, body mass index, education level, diabetes mellitus, and previous history of stroke or cardiovascular disease[10,23,27,28,30]. Studies by Thakur *et al*[33], Singh *et al*[26], and Martinez *et al*[24] reported data as ORs for adjusted confounders and therefore were not included in the calculations for pooled incidence for MCI or dementia.

From a clinical approach, COPD can lead to pulmonary encephalopathy, hypoxemia, and inflammation, all of which may impact brain function[42]. Indeed, COPD patients exhibit a unique neurophysiological profile stemming from neurotoxicity featuring deficits of attention, motor, memory, and cognitive domain executive function[4]. Interestingly, the relationship between COPD and dementia persists even after accounting for the presence of vascular disease, suggesting that COPD is an independent predictor of dementia.

Our findings are consistent with the previous literature[5,11,12,42,43]. However, the available literature on the relationship between dementia and COPD remains limited, as only seven studies were found for this meta-analysis. Our study also had several other limitations. The included studies had different designs, which may be one of the leading causes of heterogeneity. Additional sources of heterogeneity may include different geographical population, variation in the diagnostic criteria of COPD, and diversity in the factors undertaken for the multivariate analysis of each included studies.

The included studies also lacked long-term follow-up data, as well as data that would facilitate subgroup analysis based on co-morbidities, age, and gender. Finally, different studies varied on how they assessed and diagnosed COPD and cognitive impairment.

CONCLUSION

Our meta-analysis revealed an elevated risk for MCI and dementia in COPD patients. Proper clinical management and attention are necessary to prevent or mitigate the incidence of MCI and dementia in COPD patients.

ARTICLE HIGHLIGHTS

Research background

Chronic obstructive pulmonary disease (COPD) is a common public health issue that has been linked to cognitive dysfunction. No clear evidence is available for the relationship between COPD and mild cognitive impairment (MCI) and dementia risk.

Research motivation

To our knowledge, there has only been one published meta-analysis with limited number studies investigating the statistical association of COPD with cognition dysfunction.

Research objectives

The current meta-analysis was performed to investigate the relationship between COPD and MCI and dementia risk.

Research methods

A comprehensive search was performed using PubMed, Embase, Google Scholar, and Cochrane Library online databases for articles published prior to March 31, 2021.

Research results

Twenty-seven studies met all the inclusion criteria. Meta-analysis yielded a strong association between COPD and an increased risk of MCI incidence. It also revealed a borderline trend for an increased dementia risk in COPD patients. A significant lower MMSE score in COPD patients was noted.

Research conclusions

Our findings revealed an elevated risk for the occurrence of MCI and dementia in COPD patients. Proper clinical management and attention are required to prevent and control MCI and dementia incidence in COPD patients.

Research perspectives

Further large prospective observational studies are needed to strengthen the evidence on this important subject.

FOOTNOTES

Author contributions: Zhao LY conceived and designed the study; Zhao LY and Zhou XL were involved in literature search and data collection; Zhao LY analyzed the data; Zhao LY and Zhou XL wrote the paper; Zhao LY edited the manuscript; all authors read and approved the final manuscript.

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