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Title

Chronic obstructive pulmonary disease and risk of incident cardiovascular disease and death: Systematic review and meta-analysis

Background

Whilst chronic obstructive pulmonary disease (COPD) is known to be associated with adverse respiratory outcomes such as respiratory failure and moderate to severe acute exacerbations of COPD, there is a paucity of information about the cardiovascular and kidney events associated with COPD, and estimates are conflicting.^{1,2} Understanding the wider burden of COPD may have implications for treatment targets.

Purpose

To provide a comprehensive and contemporaneous set of relative risk estimates of associations between COPD and incident cardiovascular disease and death.

Methods

We searched MEDLINE and Embase for cohort studies reporting associations between COPD and cardiovascular diseases and death. Two reviewers independently extracted study characteristics and reported risk ratios of incident outcomes associated with COPD. We synthesised for binary outcomes, including only those reported in at least two studies with ≥ 10 participants in both COPD and non-COPD cohorts. Hazard ratios and odds ratios were converted to approximate relative risks (RRs) to allow consistent pooling. Pooled estimates were obtained using random-effects models with restricted maximum likelihood estimation. For each outcome, the synthesised baseline absolute event rate in the control group was multiplied by $(RR - 1)$, yielding the corresponding ARD. Seven pre-specified sensitivity

analyses (design, follow-up, region, context, sample size, publication date, risk of bias) and subgroup analyses by age were undertaken.

Results

Of 139 cohort studies including 30 086 346 patients (3 056 048 with COPD) with median follow up duration 3·0 years (interquartile range 1·0 - 5·2 years), COPD was associated with increased risk of heart failure (risk ratio [RR] 2·33, 95% confidence interval [CI] 1·78–3·06), ventricular tachycardia (2·05, 1·27–3·31), heart failure hospitalization (1·78, 1·28–2·47), all-cause mortality (1·56, 1·42–1·70), cardiovascular mortality (1·55, 1·33–1·82), myocardial infarction (1·47, 1·28–1·68), ischaemic stroke (1·38, 1·18–1·62) and atrial fibrillation (1·38, 1·19–1·61) when compared to those without COPD (Figure 1). The absolute risk difference was 8.02% (95%CI 3.95-15.4) for heart failure, 14.70% (8.97-23.20), 8.02% (3.95 – 15.40) for heart failure hospitalisation, 5.28% (4.14-6.69) for all-cause mortality, 2.4% (1.38-4.10) for cardiovascular mortality, 1.04% (0.74-1.45) for myocardial infarction, 2.95% (1.77-4.81) for atrial fibrillation and 0.86% (0.66 – 1.14) for stroke.

Conclusion

COPD is associated with high risk for a range of incident cardiovascular diseases. The impact of current and novel treatments on a broader range of cardiovascular outcomes in COPD warrants further assessment.³

References

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