Body mass index associated with lowest all-cause mortality in Chronic obstructive pulmonary disese: Evidence from four Scandinavian population-based cohorts

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Background

We hypothesised that BMI associated with the lowest all-cause mortality differs between individuals with and without COPD and by disease severity.

Methods

We included individuals aged ≥40 years from four population-based cohorts in Scandinavia: The Trøndelag Health Study (HUNT), Copenhagen City Heart Study (CCHS), Copenhagen General Population Study (CGPS), and Obstructive Lung Disease in Northern Sweden (OLIN). COPD was defined as a pre-bronchodilator forced expiratory volume in 1 second (FEV1)/forced vital capacity (FVC) below the lower limit of normal. A clinical definition of COPD additionally required chronic respiratory symptoms and ≥10 pack-years of smoking. Mortality over up to four decades was analysed using Cox proportional hazards models to estimate hazard ratios (HRs) with 95% confidence intervals CI), followed by random-effects meta-regression to generate unified BMI–mortality curves (Figure1).

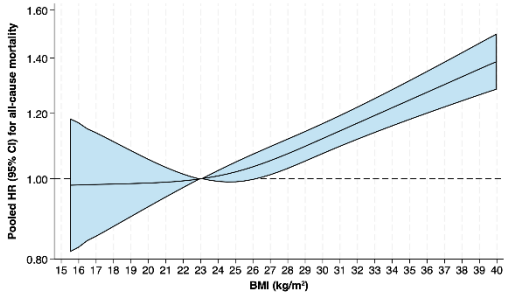
Results

In total 131,179 individuals were included, 14,027 had COPD and 6,114 had clinical COPD. During a mean follow-up of 15.3 years, 28,345 deaths were recorded. BMI associated with the lowest all-cause mortality was 23.5 kg/m2 (HR: 1.00 [95% CI: 1.00–1.01]) among individuals without COPD compared to 28.0 kg/m2 (0.83 [0.79-0.86]) among those with COPD and 28.0 kg/m2 (0.80 [0.74–0.86]) among those with clinical COPD. Among individuals with COPD, corresponding BMI values were 27.0 kg/m2 (0.87 [0.83–0.91]) in those with FEV1 ≥50% predicted and 30.0 kg/m2 (0.85 [0.76–0.94]) in those with FEV1 <50% predicted.

Conclusions

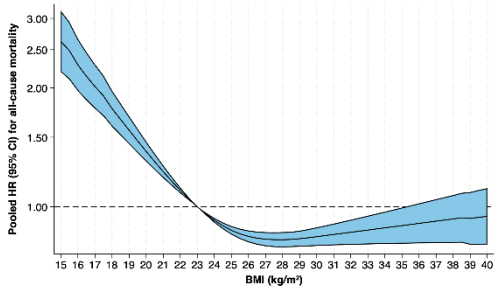
Optimal BMI for survival was higher in individuals with COPD than in those without, particularly in those with severe airflow obstruction. Our results suggest that BMI thresholds for clinical concern in COPD may need to be reconsidered relative to general population guidelines.

No-COPD, n = 117,152



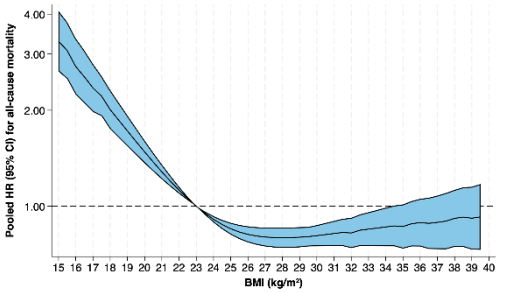
BMI: 23.5 kg/m^2 (HR: 1.00; 95% CI: 1.00–1.01)

COPD, n = 14,027



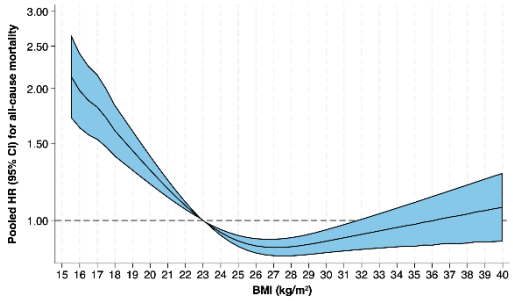
BMI: 28.0 kg/m^2 (HR: 0.83; 95% CI: 0.79–0.86)

Clinical COPD, n = 6,114



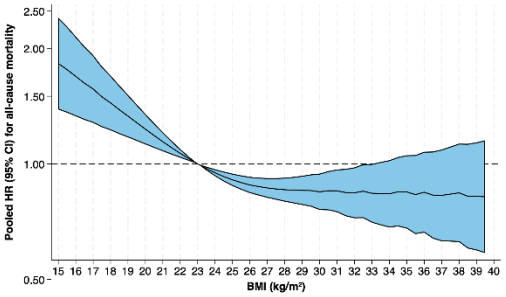
BMI: 28.0 kg/m^2 (HR: 0.80; 95% CI: 0.74–0.86)

GOLD stage 1-2, n = 11,829



BMI: 27.0 kg/m^2 (HR: 0.87; 95% CI: 0.83–0.91)

GOLD stage 3-4, n = 2,198



BMI: 30.0 kg/m^2 (HR: 0.85; 95% CI: 0.76–0.94)

Figure 2. Association between BMI and all-cause mortality according to No-COPD, COPD, Clinical COPD and COPD severity: meta-regression analysis using restricted cubic splines

The reference value is BMI 23. Confidence intervals (95% CI) are shown for estimated Hazard ratio (HR) along the curve, but not for the reference point. COPD defined as a pre-bronchodilator forced expiratory volume in 1 second (FEV1)/forced vital capacity (FVC) < the lower limit of normal (LLN) and clinical COPD as FEV1/FVC <LLN combined with chronic respiratory symptoms (dyspnoea, cough and phlegm, wheezing/whistling, or chest pain/tightness) and smoking history of >10 pack-years. No COPD defined as FEV1/FVC ≥LLN. BMI: Body mass index; COPD: Chronic obstructive pulmonary disease. GOLD: Global Initiative for Chronic Obstructive Lung Disease.