

Revisiting the Obesity Paradox: Insights from Pulmonary Embolism Patient Outcomes

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Background: Obesity is an epidemic in the US and has been associated with increased incidence and severity of cardiovascular disease and increased risk for pulmonary embolism (PE). However, the evidence of its effect on outcomes in PE patients remains equivocal. We aimed to investigate the impact of obesity on adverse in-hospital outcomes in PE.

Methods: This study conducted a comprehensive analysis of the National Inpatient Sample (NIS) database, focusing on adult patients (aged ≥ 18 years) with a discharge diagnosis of PE (ICD-10 code: I26) from 2016 to 2020. We specifically identified obese patients using the Elixhauser comorbidity measure within NIS and compared them to non-obese patients in terms of adverse in-hospital outcomes.

Results: Between 2016 and 2020, there were 1,940,294 discharges for PE, with 436,505 patients (22%) identified as obese. A rising trend of obesity among PE patients was observed, increasing from 21.5% in 2016 to 24.3% in 2020. Obese patients, when compared to their non-obese counterparts, were more female (57.4% vs 49.1%, $p < 0.001$), younger (mean age 58.4 ± 15.1 years vs 64.0 ± 17.1 years, $p < 0.001$), and African American (21.2% vs 17.5%, $p < 0.001$). They also had higher rates of comorbid conditions like CHF (25.1% vs 21.2%, $p < 0.001$), hypertension (70.6% vs 58.2%, $p < 0.001$), diabetes (37.2% vs 21.5%, $p < 0.001$), and renal failure (16.2% vs 14.7%, $p < 0.001$). Obese patients were more likely to receive systemic thrombolytics (3.80% vs. 2.31%, $p < 0.001$), undergo surgical thrombectomy or embolectomy (0.24% vs. 0.16%, $p < 0.001$), and receive catheter-directed thrombectomy or thrombolysis (3.04% vs. 1.37%, $p < 0.001$). Paradoxically, despite these comorbidities and complications, obese patients demonstrated lower mortality rates (4.58% vs 7.60%, $p < 0.001$), mechanical intubation (7.71% vs 8.90%, $p < 0.001$), and shock requiring pressor support (1.73% vs 2.14%, $p < 0.001$). After adjusting for demographic factors, all comorbidities, and reperfusion therapies, the analysis consistently showed a reduced adjusted odds ratio for in-hospital mortality among obese patients (OR 0.63, 95% CI 0.61-0.65, $p < 0.001$).

Conclusions: Analyzing nearly two million inpatient cases of PE, our study revealed an intriguing association between obesity and reduced in-hospital mortality rates in PE patients. Notably, despite a higher prevalence of comorbidities and more frequent need for reperfusion interventions, obese patients exhibited lower mortality rates and fewer complications, such as the need for mechanical intubation and shock. This survival advantage in obese individuals persisted even after adjusting for potential confounders. These findings align with a similar study conducted on the German nationwide inpatient database and reflect the broader concept of the 'obesity paradox,' previously observed in cardiovascular diseases and chronic obstructive pulmonary diseases. However, whether these results indicate a true protective effect of obesity, a 'lean paradox,' or are due to unidentified confounders remains a subject for further investigation.