

Obesity may be a more significant risk factor for death from COVID-19 for men than women

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Obesity may be a stronger risk factor for death, severe pneumonia and the need for intubation in men than in women with COVID-19,

according to a study published in the *European Journal of Clinical Microbiology & Infectious Diseases*.

An analysis of a cohort of 3530 COVID-19 patients showed that both moderate (BMI of $35/\text{m}^2$ or higher) and [severe obesity](#) (BMI of $40\text{kg}/\text{m}^2$ and higher) in men but only severe [obesity](#) in women (BMI of $40\text{kg}/\text{m}^2$ and higher) was associated greater risk of developing severe disease, needing intubation and dying from COVID-19 in hospital.

Previous research demonstrated that obesity is a risk factor for hospitalization, severe disease, and [death](#) in patients with COVID-19. However, whether all classes of obesity are associated with worse outcomes and whether this varies between men and women has not been clear.

A team of researchers at Montefiore Medical Center, Bronx, New York, USA examined data obtained from [electronic health records](#) on 3530 patients with COVID-19, admitted to the inpatient medicine service or the intensive care unit at Montefiore Medical Center from 10th March to 1st May 2020.

Patients were classified into six groups based on BMI. Out of the 3530 patients included in this analysis, 1579 were women, 896 had a BMI below $25 \text{ kg}/\text{m}^2$ (normal weight—this number also included people in the underweight group at BMI $18\text{kg}/\text{m}^2$ and lower), 1162 had a BMI of $25\text{-}29 \text{ kg}/\text{m}^2$ (overweight), 809 had a BMI of $30\text{-}34 \text{ kg}/\text{m}^2$ (class I obesity), and 663 had a BMI of $35 \text{ kg}/\text{m}^2$ or higher (class II and III obesity). The authors investigated associations between these groups and death in hospital, the need for intubation and the development of severe pneumonia.

The authors found that patients with class II and III obesity had a higher likelihood of in-hospital mortality, especially when compared to patients

in the [normal weight](#) group, and that this association was stronger as obesity class increased. These patients were also more likely to develop severe pneumonia and to undergo intubation. In men, both class II (BMI 35-40kg/m²) and class III obesity (BMI higher than 40kg/m²) were associated with higher risk of death, while the same was only the case for women in obesity class III.

The authors also investigated if systemic inflammation was associated with obesity, higher risks of death, the need for intubation and the risk of developing severe pneumonia. Systemic inflammation was assessed by measuring levels of the cytokine interleukin 6 (IL-6). Cytokines are signalling molecules that regulate immunity, inflammation and hematopoiesis, the manufacture of new blood cells.

Arcelia Guerson-Gil, the corresponding author said: "It is known that a major cause of disease severity and death is an excessive inflammatory response to SARS-CoV-2 that is associated with high levels of circulating cytokines, such as IL-6. Obesity is considered a state of enhanced chronic inflammation, so we suspected there may be an association between body mass index and [systemic inflammation](#) as indicated by IL-6 level. However, we found that this wasn't the case."

The authors found that patients who died from COVID-19 had higher average levels of IL-6 compared to survivors and that men had higher average levels of IL-6 compared to women. Average IL-6 levels also increased with age. However, the authors found no clear association between IL-6 and obesity, suggesting that while inflammation may play a role in severe disease and death from COVID-19, it may not be the mechanism that underlies the association between severe disease, death and obesity.

The authors speculate that obesity may increase the risk of worse outcomes in patients with COVID-19 via other mechanisms, such as

affected lung function, increased work of breathing or a higher expression of the ACE2 receptor, which allows SARS-CoV-2 to enter cells, in adipose tissue.

The authors caution that the retrospective study design does not allow for conclusions about cause and effect and that the rapidly changing management of patients with COVID-19 might have affected the results. Further studies are needed to confirm the findings and pilot clinical trials would be useful to assess whether drugs targeting visceral adipose tissue may improve outcomes.

More information: Arcelia Guerson-Gil et al. Sex-specific impact of severe obesity in the outcomes of hospitalized patients with COVID-19: a large retrospective study from the Bronx, New York, *European Journal of Clinical Microbiology & Infectious Diseases* (2021). [DOI: 10.1007/s10096-021-04260-z](https://doi.org/10.1007/s10096-021-04260-z)

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