

Does Obesity Paradox Exist in COVID-19 Mortality?

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There were many studies in the early days of the coronavirus disease 2019 (COVID-19) pandemic on determining risk factors related to mortality from COVID-19, and obesity was one of them. Obesity has been reported as a risk factor for increased mortality rate of COVID-19 infection, along with increased hospital admissions, intensive care unit (ICU) care, airway intubation, and use of ventilators. The relationship between obesity and poor outcomes in COVID-19 has been consistently reported across diverse studies.¹⁻⁵

It is not yet clear why obesity is associated with a poor outcome of COVID-19 infection. As is well known, obesity causes chronic inflammation and the secretion of various cytokines. Such a relatively high level of cytokines can lead to more severe inflammation in acute infections caused by COVID-19, with extreme consequences such as a cytokine storm.⁶ In addition, obesity-induced rises in blood sugar, blood pressure, and abnormal lipid metabolism are expressed in the form of metabolic syndrome, which is known to weaken the immune system. It is conceivable that these pro-inflammatory and metabolic adverse effects of obesity will adversely affect COVID-19.⁷

In a study by Thoppil et al.,⁸ increased body mass index (BMI) and metabolic syndrome have been associated with adverse outcomes in COVID-19 infection. This study was a very large-scale

study, involving more than 27,000 patients who visited emergency rooms at 155 institutions. They reported a significant association of both high BMI and composite metabolic syndrome with poor outcomes in severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)-positive patients. They reported that BMI ≥ 30 kg/m² increased odds of SARS-CoV-2 test positivity and BMI ≥ 40 kg/m² was significantly associated with ICU care, intubation, and mortality. Not only obesity but also metabolic syndrome was significantly associated with the need for admission, ICU care, mortality, and venous thromboembolism in SARS-CoV-2-positive patients. However, the increase in mortality among obese patients was significantly related only to BMI above 40 kg/m², and did not show a statistically significant increase in mortality from BMI above 30 to 40 kg/m². Collins et al.⁹ also found that the length of COVID-19 hospitalization is inversely related to BMI. These results could be explained partly by the obesity paradox. The obesity paradox is the theory that the mortality rate in patients with chronic diseases including respiratory diseases can be lower in those with obesity.

Since BMI is calculated by simply measuring the height and weight, it has a disadvantage in that it does not reflect the degree of fat accumulation, particularly the degree of visceral fat, which causes metabolic abnormalities in obese patients. Although this study also

showed that obesity was associated with poor outcomes for COVID-19 with only BMI above 40 kg/m², all patients with metabolic syndrome showed poor outcomes.⁸ This adverse effect of obesity is related to metabolic abnormalities, such as metabolic syndrome, rather than BMI. Thus It may be unreasonable to conclude that these results are due to the obesity paradox.

Diagnostic criteria for obesity according to BMI differ by ethnicity, so it is not sufficient to simply talk about the starting point of increased mortality based on BMI. The reason for such different criteria for diagnosing obesity according to BMI and ethnicity is that the risk of metabolic disease is different depending on the degree of BMI. Just as Asians use a lower BMI as a diagnostic criterion for obesity, even at a lower BMI, the mortality rate may increase depending on ethnicity.¹⁰ There are also ethnic differences in mortality from COVID-19 infection.¹¹ Thus ethnic differences related to obesity and mortality of COVID-19 should also be taken into account.

In addition, the recently prevalent variants of the COVID-19 virus, especially the omicron variant, have a lower mortality rate or conversion rate to severe disease compared to the previous virus variants, specifically those that were prevalent at the time of the previous study, especially the delta variant.¹² Since more variants are expected to appear in the future, it may be necessary to compare the relationship between obesity and mortality according to each virus variant.

CONFLICTS OF INTEREST

The author declares no conflict of interest.

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