

# Understanding African American COVID-19 Severity and Mortality: Is Obesity the Key?

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The severe acute respiratory syndrome coronavirus 2 pandemic is eponymously characterized as a life-threatening pulmonary condition that has caused widespread global morbidity, mortality, and economic distress. Although advanced age is the most potent predictor of adverse coronavirus disease 2019 (COVID-19) outcomes and mortality, increased BMI and adiposity appear to be major contributors, especially in younger adults under 65 years of age. The obesity–COVID-19 severity link is particularly relevant in the United States, where the age-adjusted adult prevalence of obesity was 36.2% in 2016 compared with 6% in China, 20% in Italy, and 24% in Spain (1). Furthermore, non-Hispanic black adults (i.e., African Americans [AA]), especially black women (56.9%), have the highest prevalence of obesity and severe obesity compared with other US races and Hispanic-origin groups (2). Therefore, obesity may be central to understanding the disparate AA COVID-19 mortality.

Recently, two *Obesity* journal reports were published indicating the role of obesity, especially in AA (3,4). However, the disproportionate COVID-19 mortality in AA and other disadvantaged groups reflects long-standing systemic health inequalities and diminished life expectancy. Well before the existence of COVID-19, adverse factors, including poorer underlying health, barriers to preventive health care, absent or substandard health insurance, and at-risk occupational exposures, disproportionately affected racial/ethnic minorities (5,6). Pulmonary complications do not fully capture the breadth of COVID-19 morbidity and mortality. Severe acute respiratory syndrome coronavirus 2 infection is also associated with cardiovascular disease complications and associated risk factors.

In recognition of the distressingly high COVID-19 outcomes in AA, two important single-site studies have been published from New Orleans, Louisiana, and Chicago, Illinois, both early US COVID-19 pandemic hot spots. Adiposity is clearly associated with multiple conditions and variables and is not definitively an independent COVID-19 severity risk factor. However, the increased obesity–COVID-19 association was recognized previously in Seattle, Washington, including severity and specific critical findings (7).

One present study by Alkhatib and colleagues (3), a retrospective sample of 158 consecutive patients from a tertiary center in New Orleans, measured BMI as a continuous variable and intensive care unit admissions as an end point. Although, overall, patients with severe disease were older (62 vs. 55 years,  $P=0.003$ ), the mean age was relatively young at 57 years, with 61% women. These findings are somewhat at odds with the concept that COVID-19 severity is predominantly seen in persons over 65 and closely linked to male sex. Adjusting for other

comorbidities and stratifying, BMI greater than 40 kg/m<sup>2</sup> was associated with severe disease with an odds ratio of 20.83. In this entirely AA sample, diabetes mellitus and chronic kidney disease were also significantly higher in patients with severe disease ( $P=0.022$  and 0.019, respectively). It is heartening that the authors call for more inclusive research aimed at optimizing clinical care relevant to the AA population and a more equitable response to COVID-19 (3).

Although exact mechanisms for death in this sample are largely unknown, clinicians can add obesity as a potential signal for increased respiratory distress and mortality (4). In patients with obesity and severe obesity, associated factors of decreased expiratory reserve volume, functional capacity, respiratory system compliance, compromised function in supine patients by decreased diaphragmatic excursion, and increased inflammatory cytokines may contribute to the increased morbidity associated with obesity in COVID-19 infections (4).

Accordingly, in a recent large case series of 5,700 patients hospitalized with COVID-19 in the New York City area, including 1,230 (22.6%) AA, obesity was reported to increase the odds ratio for death by 3.05 (95% CI: 1.57–5.92) (8). Moreover, among 3,615 individuals in a large New York City academic hospital, without defined percentages based on race/ethnicity, obesity and COVID-19 appeared to affect severity at younger ages. For those aged less than 60 years, those with BMI between 30 and 34 kg/m<sup>2</sup> and those with BMI > 35 kg/m<sup>2</sup>, compared with those of normal weight, were 1.8 times and 3.6 times more likely, respectively, to be admitted to critical care (9). Similarly, in 265 patients (58% male) from several US university hospitals, obesity was a salient risk factor for severe COVID-19 disease. The authors proposed increased public messaging to younger adults, proactive virus testing in individuals with obesity, and maintaining greater vigilance for this at-risk population to help ameliorate widespread, severe COVID-19 disease (10).

It is difficult to disaggregate obesity-associated COVID-19 mortality from hypertension and diabetes to prove a cause–effect relationship. However, heightened obesity-related metabolic and inflammatory pathways may adversely alter the course of COVID-19 and individuals with obesity. This may amplify or dysregulate immune responses, with excess adipose tissue leading to virus-activated cytokine storm syndrome (11). Patients with COVID-19 and diabetes appear significantly more likely to die compared with those without diabetes (7.8% vs. 2.7%;  $P<0.001$ ), with a crude hazard ratio of 2.90 ( $P<0.001$ ). Hence, obesity and associated uncontrolled diabetes may be a risk factor for rapid progression and poorer prognosis of COVID-19 (12).

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Moreover, hypertension may additionally lead to increased severity. In a meta-analysis of 6,560 patients, pooled from 30 studies, hypertension was associated with increased composite poor outcome (risk ratio 2.11 [95% CI: 1.85-2.40],  $P < 0.001$ ) and its subgroup, including mortality (risk ratio 2.21 [1.74-2.81],  $P < 0.001$ ) (13).

Both US and English governmental recommendations identify a person's vulnerability and risk for severe illness linked to BMI  $\geq 40$  kg/m<sup>2</sup> (14,15). Therefore, the COVID-19 pandemic offers an opportunity to more effectively address the obesity "epidemic," including youth primordial prevention, especially in US minorities, before obesity becomes evident. Instead of stigmatization of black adults with obesity, this pandemic, a hopefully once-in-a-century health crisis, is a clarion call to decrease and eventually eliminate long-standing health disparities and underlying adverse societal structural factors (16,17). **O**

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