

# Does Obesity Increase the Risk of Brain Damage following COVID-19 Infection?

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**Citation:** Saruko E, Pleger B (2021) Does Obesity Increase the Risk of Brain Damage following COVID-19 Infection? *J Obes Overweig* 7(1): 102

**Keywords:** Covid-19; Brain Damage; Obesity; Neuroimaging

Neurological impairments associated with Covid-19 have been the subject of numerous investigations since the end of 2019, when the SARS-CoV-2 virus appeared and showed a staggering rise worldwide. Neuroimaging in patients infected with Covid-19 revealed the apparition of severe brain pathologies, such as acute perfusion deficits and white matter abnormalities, meningeal enhancement, basal ganglia lesions, intracranial hemorrhage, encephalitis, cerebral venous thrombosis, encephalopathy, and stroke [1,2].

Poor outcomes following Covid-19 infection are positively correlated to the body mass index (BMI) [3]. Due to alterations in respiratory, vascular, and immune functions, persons with obesity present higher morbidity and mortality. After age, severe obesity is held as being the second most important hospitalization predictor in persons infected with Covid-19, with a BMI-related increasing risk for mechanical ventilation [4].

Despite convincing evidence that obesity is associated with the severity of acute Covid-19 infection, the relationship between BMI and persistent neurological symptoms remains unexplored. To our knowledge, only one study so far considered BMI of Covid-19 patients but found no correlation with the observed brain pathologies (hemorrhage, infarction, and leukoencephalopathy). However, participants with and without Covid-19 had a mean BMI of 27.9 kg/m<sup>2</sup> and 28.5 kg/m<sup>2</sup>, respectively, indexing them as mainly overweighted but not obese [5].

Gustatory and olfactory impairments are the most frequently occurring neurological symptoms, not only when acutely being infected but also when symptoms persist thereafter. How these impairments influence eating behavior remains a challenging question. Future Covid-19 studies on persistent neurological symptoms, especially impairments of taste and smell, should consider patients' BMI. Systematically investigating the relationship between taste and smell impairments and their central nervous origins in chronic Covid-19 patients could notably constitute a reliable basis for our understanding, not only on how the SARS-CoV-2 virus attacks the central nervous system, but also on how impairments of taste and smell as well as their rehabilitation affect food choices and eating behavior in obesity.

In Germany, more than 15.000 post-Covid patients were already declared to be unfit for work, mainly because of persistent neurological problems. All of them will now be send to health checks. Initiatives like this offer large sample sizes with statistical power that even allows subcohort analyses, for instance, divided according to BMI. There will be comparable initiatives in many other countries around the world. Scientists are now demanded to convey large clinical assessments and to address crucial questions about Covid-19 and its impact on our health. Particular attention should also be paid to considering BMI and associated comorbidities.

This letter was funded by the Ruhr University Bochum (FoRUM F971R-2020) and Bundesministerium für Bildung und Forschung (BMBF - nutriCARD WP1B1/WP1B2).

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