Excess weight, not high blood sugar, associated with increased risk of COVID-19 infection and long COVID

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High body mass index (BMI), rather than high blood sugar levels, are associated with excess risks of COVID-19 infection and long COVID,

according to a meta-analysis of over 30,000 UK adults from nine large prospective cohort studies.

The findings by Dr. Anika Knuppel from the MRC Unit for Lifelong Health and Ageing, University College London, UK, and colleagues are being presented at this year's European Association for the Study of Diabetes (EASD) Annual Meeting in Stockholm, Sweden (19-23 Sept).

"Early in the pandemic research identified diabetes and obesity as risk factors for becoming severely ill with COVID-19. And we know that many people living with type 2 diabetes are also carrying excess weight. Our early findings support the idea that obesity-related mechanisms may be responsible for the excess risks of COVID-19 associated with diabetes, rather than high blood sugar per se," says Dr. Knuppel.

Previous research showed that people with diabetes and obesity are more likely to become severely ill and die if they catch COVID-19, but are no more likely to contract it. However, the underlying mechanisms, and their role in prolonged post-COVID-19 symptoms (long COVID), remains unclear.

To find out more, researchers looked for associations between a range of clinical characteristics measured before the pandemic—HbA1c (average blood sugar level), self-reported or medication-based diabetes, body mass index (BMI) and waist-to-hip ratio (WHR)—and self-reported COVID-19 infection and long COVID in nine ongoing UK cohort studies.

The analyses included the most recent measurements (taken between 2002 and 2019) of HbA1c, weight, height, waist and hip circumference from each study as well as information from questionnaires on health and lifestyle.

All eligible participants (maximum 31,252, aged 19-75 years old, 57% female) had data on previous measurements and completed at least one questionnaire during the COVID-19 pandemic (May 2020 to September 2021) covering questions on COVID-19 and, where possible, questions on the length of ongoing COVID-19-related symptoms.

Participants reported having COVID-19 based on a positive test or strong suspicion. Long COVID was defined as symptoms that went on or affected functioning for longer than four weeks post-infection and was compared to those reporting symptoms for less than four weeks.

Where possible, associations were adjusted for sex, smoking, ethnicity, income, and education at the time of measurement.

Between May 2020 and September 2021, 5,806 participants reported ever having COVID-19, and 584 reported having long COVID (around 7% of COVID-19 cases with information on symptoms length).

Analysis of data from 31,252 participants in nine studies found higher BMI was associated with greater odds of COVID-19 infection—with the risk 7% higher for each 5kg/m^2 increase in BMI. People with overweight (BMI 25-29.9kg/m^2) and obesity (30 kg/m^2 or greater) had 10% and 16% greater odds of COVID-19 infection, respectively, than healthy weight individuals (less than 25 kg/m^2.

Similar results were observed for long COVID (4,243 participants, six studies)—with the risk 20% higher for each 5kg/m^2 increase in BMI. People with overweight and obesity had 20% and 36% greater odds of long COVID, respectively. However, for both COVID infection and long COVID associations with categories of BMI were not all statistically significant (so we cannot be sure they are not due to chance).

Analysis investigating the association with WHR were inconclusive.

Notably, studies focusing on average blood sugar level (HbA1c) and diabetes (15,795 participants and 1,917 for long COVID) revealed no association with COVID-19 or long-COVID.

The researchers stress the need for further research to explore the mechanisms underpinning these associations and to reduce the excess risk associated with high BMI. "Our early findings suggest a link of adiposity with COVID-19 infection and long COVID-19 even after taking into account socio-demographic factors and smoking. We need to further explore what makes people with overweight and obesity at risk of worse outcomes and how this relates to severe cases", says Knuppel.

The authors acknowledge that the study was observational and cannot prove that higher BMI increases the risk of COVID-19 infection, and they cannot rule out the possibility that other unmeasured factors (e.g., underlying conditions) or missing data may have affected the results. They also point out that COVID-19 was based on suspicion rather than a positive test, and clinical measurements taken before the pandemic could be outdated for some of the included studies. Finally, they note that study participants were healthier than the general population which may limit the conclusions that may be drawn.

Provided by Diabetologia

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