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Long COVID in people with diabetes: Evidence from a UK population-based study

A multi-system syndrome can develop in the weeks following a severe acute respiratory syndrome-related coronavirus (SARS-CoV-2) COVID-19 infection. It is referred to as long COVID. Long COVID is characterised by fatigue, muscle weakness, malaise, breathlessness and concentration impairment or brain fog. Other less frequent symptoms include excess perspiration, chest pain, sore throat, sensory disturbance, anxiety and headaches (Michelen et al, 2021). There is now a large body of evidence concerning the phenomenology and natural history of long COVID, and an increasing understanding of predisposing factors. However, less work has been done that relates to the prevalence of long COVID at a population level, and how its prevalence may vary according to specific underlying conditions, such as diabetes.

The authors of a recent paper (Heald et al, 2024) described the prevalence of long COVID in people with type 1 diabetes and type 2 diabetes compared with matched non-diabetes individuals, using a database for primary healthcare for a population of approximately 2.87 million people (Visit North West, 2024) in Greater Manchester called the Greater Manchester Care Record (GMCR; NHS Manchester, 2024).

The primary aims of the study were to determine whether an underlying diagnosis of type 1 diabetes or type 2 diabetes predisposed people to develop long COVID, following an acute COVID-19 infection, in comparison to people without diabetes, and to determine the predisposing factors for long COVID in people with diabetes compared with non-diabetes individuals.

All primary care coded data, including laboratory test results, were available for analysis. The available data included everyone alive on 1 January 2020. The histories of type 1 diabetes and type 2 diabetes were based on general practice coded diagnoses. After data cleaning, there were 3087 type 1 diabetes

individuals with 14 077 non-type 1 diabetes controls, and 29 700 type 2 diabetes individuals with 119 951 non-type 2 diabetes controls. People were considered to have long COVID if they either had a long COVID diagnosis code or a long COVID referral code made in the period up to 30 September 2023. This is in line with previous work on long COVID in databases of routinely collected data in the UK (Walker et al, 2021).

Of the type 2 diabetes individuals, 12% were treated with insulin, in addition to oral hypoglycaemic agents.

Findings

The key findings included that, for people with type 1 diabetes, there was a lower proportion of long COVID diagnosis and/or referral to a long COVID service compared with matched non-type 1 diabetes controls (0.33% vs 0.48%). For those with type 2 diabetes, the prevalence of long COVID was 0.53% compared to 0.54% in matched controls (i.e. very similar). Importantly, in type 2 diabetes as recorded, long COVID rates were similar for men and women, whereas in the non-diabetes control group long COVID was much more common in women than men. Long COVID was more prevalent in men with type 2 diabetes than in matched controls, with the opposite seen for type 2 diabetes women (*Figure 1*).

Regarding factors predisposing to the development of long COVID in the groups combined, younger age, female sex, mixed ethnicity and higher BMI were all associated with a greater likelihood of developing the condition. The estimated prevalence of long COVID in the general population, based on general practice coding (not self-reported) of this diagnosis, was 0.5% of people with a prior confirmed acute COVID-19 diagnosis.

Implications

Long COVID prevalence was no higher in type 2 diabetes than in matched controls (i.e. the

Adrian H. Heald,^{1,2}
Richard Williams,^{3,4}
Kevin McCay,⁵ William
Ollier⁵

¹The School of Medicine and Manchester Academic Health Sciences Centre, The University of Manchester, Manchester

²Department of Diabetes and Endocrinology, Salford Royal Hospital, Salford

³Division of Informatics, Imaging and Data Science, Faculty of Biology, Medicine and Health, University of Manchester; Manchester Academic Health Science Centre, Manchester

⁴NIHR Applied Research Collaboration Greater Manchester, Faculty of Biology, Medicine and Health, University of Manchester, Manchester

⁵Faculty of Science and Engineering, Manchester Metropolitan University, Manchester

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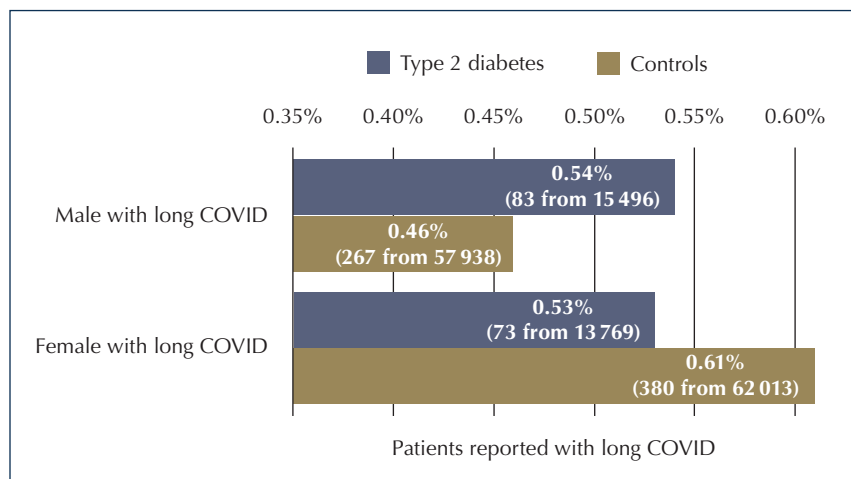


Figure 1. The recorded prevalence of long COVID in men and women with and without type 2 diabetes.

rest of the population). The prevalence of long COVID in males with type 2 diabetes compared to females with type 2 diabetes was similar, in contrast to much higher rates in females for the whole population. In other words, there was little difference in long COVID prevalence rate between sexes for people with type 2 diabetes.

This may relate to the fact that both men and women with type 2 diabetes in the UK attend their general practices regularly for monitoring of their condition. They are potentially more likely to report symptoms, which may increase the likelihood of long COVID being spotted in men. Conversely, in the general population, young to middle-years women are more likely to attend their general practices than their male counterparts, for reasons often related to women's health, and long COVID symptoms may be reported at these consultations. The higher recorded rates of long COVID in men with type 2 diabetes than in matched controls may also relate to yet to be determined underlying biological factors, and possibly a direct consequence of having type 2 diabetes on the development of long COVID.

In regression analysis, younger age, female sex, mixed ethnicity and higher BMI were all associated with a greater likelihood of developing long COVID in people with type 2 diabetes. Thus, the risk factors are similar to those that relate to becoming seriously unwell after a COVID-19 infection and to the development of long COVID

in the general population (Heald et al, 2022; Subramanian et al, 2022).

The strengths of this study are that the data analysed were comprehensive and covered all but two of the general practices in the conurbation of Greater Manchester, which has a high-resolution integrated primary care dataset. Furthermore, the COVID-19 pandemic period was covered up to mid-September 2023.

Regarding weaknesses, not all acute COVID-19 diagnoses were recorded in general practice. Furthermore, for the diagnosis of long COVID, we relied on general practice coding rather than any systematic diagnostic schedule.

In conclusion, there remains an imperative for continuing awareness of long COVID as a differential diagnosis for multi-system symptomatic presentation following acute COVID-19 in people with type 2 diabetes, as in the wider population. The similar rates of long COVID in men and women with type 2 diabetes reported in this paper are intriguing, and suggest that diabetes reviews in both sexes should include a question about long COVID symptoms.

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