Post-COVID-19 condition symptoms 12 and 24 months after COVID-19 during the first month of the pandemic in Melbourne: a cohort study

Dorothy Q Ling, Grace Gibney, Fiona James, Natasha E Holmes, Kyra YL Chua

The post-coronavirus disease 2019 (COVID-19) condition, or long COVID, is an illness that can affect people with a history of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection. It is characterised by symptoms not explained by an alternative diagnosis that persist for at least two months.[1]

In this article, we report the 12- and 24-month follow-up of a cohort of people infected with SARS-CoV-2 during a five-week period in 2020.[2] We invited all people with polymerase chain reaction (PCR)-confirmed SARS-CoV-2 infections during 10 March – 15 April 2020 who were managed at Austin Health, Melbourne, for follow-up twelve months (19 April – 3 June 2021) and 24 months (14 April – 17 June 2022) after their acute illness. Participants completed a structured telephone interview in which they reported and ranked the severity of symptoms on an ordinal scale (from 0 = no symptoms to 10 = most severe; Supporting Information, table 1). At the 12-month follow-up, we also collected information on symptoms prior to acute COVID-19. Study data were managed using REDCap (Vanderbilt University) electronic data capture tools hosted at Austin Health. Continuous variables are summarised as medians with interquartile ranges (IQRs). We assessed the effects of age, gender, other medical conditions (age-adjusted Charlson comorbidity index), number of SARS-CoV-2 vaccine doses, and hospitalisation on the likelihood of post-COVID-19 condition in binomial logistic regression analyses (further details: Supporting Information). The missing data proportion was smaller than 1% for all variables. Statistical analyses were performed in SPSS 28.0 (IBM). Our study was approved by the Austin Health Human Research Ethics Committee (HREC/72673/Austin-2021).

Of eighty eligible people (Supporting Information, table 2), 66 participated in the 12-month follow-up (83%); 37 were men (56%), their median age was 57 years (IQR, 39–66 years), and 56 were white (85%). Two participants were immunosuppressed. All had experienced symptomatic COVID-19; 47 had been managed as outpatients (71%), 16 had been admitted to hospital (24%), and three had required intensive care (5%). Nine people had received at least one vaccine dose (14%), two (3%) had received two or more doses. No participants reported a second SARS-CoV-2 infection; seven (11%) had been admitted to hospital since their acute COVID-19 episode (Supporting Information, table 3).

Fifty-one people participated in the 24-month follow-up (64%); all had received at least one vaccine dose, and 50 had received two or more doses (98%). Eleven participants reported second SARS-CoV-2 infections (22%), of which nine were PCR-confirmed. Twelve participants had been admitted to hospital since their acute COVID-19 episode (24%) (Supporting Information, table 3).

Thirty-eight participants (58%) reported at least one symptom at twelve months, and seventeen (33%) at 24 months (Box). The median severity of symptoms affecting the performance of activities of daily living at twelve months was 3 (IQR, 1–5), at 24 months 3.5 (IQR, 1.5–5). The most frequent symptoms at twelve months were mood disorders (anxiety, 42 people [64%]; depression, 32 [49%]), fatigue (35, 53%), and chronic sleep problems (31, 47%); at 24 months, mood disorders (anxiety, 33 [65%]; depression, 23 [45%]), chronic sleep problems (20, 39%), and subjective memory impairment (19, 37%) were the most frequent symptoms. Similar findings were yielded by a *post hoc* sensitivity analysis that excluded participants who reported second SARS-CoV-2 infections (Supporting Information, table 4). The binomial logistic regression analysis did not identify any statistically significant predictors of post-COVID-19 condition (Supporting Information, table 5).

In our longitudinal follow-up study, 58% of participants reported symptoms consistent with the post-COVID-19 condition twelve months after acute COVID-19, and 33% did so after 24 months. Most frequently reported were mood disorders, fatigue, and sleep disturbances. The prevalence of anxiety and depression at 24 months was higher than the national prevalence in 2021 (65% *v* 16.8% and 45% *v* 7.5% respectively).[3] Notably, the prevalence of anxiety and depression in this cohort was also higher prior to COVID-19 than in the general population. The proportion of respondents who reported somatic symptoms (particularly fatigue and weight change) was lower at 24 than twelve months, while the proportions of people reporting psychiatric and respiratory symptoms were similar at both follow-ups. Conversely, the proportions who reported neurocognitive symptoms, including subjective memory and cognitive impairment, were slightly larger at 24 months. An analysis of cohort studies that included a total of 1.3 million people similarly identified differences between the trajectories of neurocognitive and those of somatic and psychiatric symptoms; the increased incidence of sleep disturbances and mood disorders at one year was transient and had declined by two years after COVID-19, but not that of neurocognitive symptoms, including cognitive deficits and dementia.[4] The unclear pathophysiology of persistent neurocognitive and psychiatric symptoms after acute COVID-19 infection may include both biological and psychological mechanisms.[4]

Our small, single-centre study is the first to examine this question in Australia over two years, providing comprehensive assessment of the prevalence of the post-COVID-19 condition. Differing prevalence rates have been reported by other authors.[5] The generalisability of our findings to other people who have had COVID-19 or people infected with later viral variants is unclear. Other potential limitations of our study include recall bias (caused by inaccurate or incomplete recollection of events

Austin Health, Melbourne, VIC. dorothy.ling2@austin.org.au • doi: 10.5694/mja2.52260

Symptoms reported by participants 12 and 24 months after acute coronavirus disease 2019 (COVID-19) managed at Austin Health, Melbourne, 10 March – 15 April 2020

Characteristic	Pre-COVID-19	12-month follow-up	24-month follow-up
Participants	66	66	51
Post COVID-19 condition	—	38 (58%)	17 (33%)
Activities of daily living symptom severity, median score (IQR)	—	3 (1–5)	3.5 (1.5–5)
Respiratory symptoms			
Shortness of breath	4 (6%)	15 (23%)	11 (22%)
Symptom severity, median score (IQR):			
At rest	—	2.5 (1–4.3)	4 (1.5–5.8)
Dressing oneself	—	5 (1–4.3)	4 (4–7)
Walking up a flight of stairs	—	5 (2–6.5)	5 (2.8–6.3)
Persisting cough	0	10 (15%)	7 (14%)
Chest tightness	0	10 (15%)	8 (16%)
Runny nose	2 (3%)	11 (17%)	12 (24%)
Sore throat	0	4 (6%)	5 (10%)
Systemic symptoms			
Fever	0	3 (4%)	3 (6%)
Sweats	0	6 (9%)	4 (8%)
Myalgias	2 (3%)	12 (18%)	9 (18%)
Arthralgias	11 (17%)	22 (33%)	14 (28%)
Fatigue	4 (6%)	35 (53%)	17 (33%)
Symptom severity, median score (IQR)	—	2 (0–4)	5 (0–5)
Weight change	—	28 (42%)	12 (24%)
Weight gain	—	16 (24%)	7 (14%)
Weight loss	—	12 (18%)	5 (10%)
Mental health symptoms			
Anxiety	35 (53%)	42 (64%)	33 (65%)
Symptom severity, median score (IQR)	—	3.5 (3–6)	3 (1–5)
Depression	31 (47%)	32 (48%)	23 (45%)
Symptom severity, median score (IQR)	—	3 (2–5)	4 (2–5.5)
Gastrointestinal symptoms			
Diarrhoea or altered bowel habit	2 (3%)	7 (11%)	8 (16%)
Neurological symptoms			
Chronic headaches	0	16 (24%)	16 (31%)
Subjective memory impairment	0	16 (24%)	19 (37%)
Subjective cognitive dysfunction	2 (3%)	19 (29%)	17 (33%)
Chronic loss of taste or smell	0	13 (20%)	5 (10%)
Chronic sleep problems	6 (9%)	31 (47%)	20 (39%)

COVID-19 = coronavirus disease 2019; IQR = interquartile range. ◆

and symptoms), attribution bias, and self-selection bias. Further, the symptoms reported were temporally associated with recent COVID-19, but causal relationships cannot be established in an observational study.

In summary, we found that people frequently reported a range of somatic, psychiatric, and neurocognitive symptoms consistent with post-COVID-19 condition twelve and 24 months after COVID-19.

Competing interests: No relevant disclosures. ■

Received 14 April 2023, accepted 9 November 2023

1 Soriano JB, Murthy S, Marshall JC, et al. A clinical case definition of post-COVID-19 condition by a Delphi consensus. *Lancet Infect Dis* 2022; 22: e102-e107.

2 Chua KYL, Vogrin S, Bittar I, et al. Clinical evaluation of four commercial immunoassays for the detection of antibodies against established SARS-CoV-2 infection. *Pathology* 2020; 52: 778-782.

3 Australian Bureau of Statistics. Prevalence of mental disorders. In: National Study of Mental Health and Wellbeing (2020–2021). 22 July 2022. https://www.abs.gov.au/statistics/health/mental-health/national-study-mental-health-and-wellbeing/2020-21#prevalence-of-mental-disorders (viewed Aug 2023).

4 Taquet M, Sillett R, Zhu L, et al. Neurological and psychiatric risk trajectories after SARS-CoV-2 infection: an analysis of 2-year retrospective cohort studies including 1 284 437 patients. *Lancet Psychiatry* 2022; 9: 815-827.

5 Chen C, Haupert SR, Zimmermann L, et al. Global prevalence of post-coronavirus disease 2019 (COVID-19) condition or long COVID: a meta-analysis and systematic review. *J Infect Dis* 2022; 226: 1593-1607. ■

Supporting Information

Additional Supporting Information is included with the online version of this article.