

# Long-term cardio-respiratory effects of COVID-19

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In spite of the initial impression of being a predominant respiratory infectious disease, with better understanding of its pathophysiology along with the evolution of the disease and the clinical manifestation, coronavirus disease 2019 (COVID-19) expressed itself as a multi-system disease. Its clinical features are the result of infection itself, aberrant immunological reactions and inflammation, psycho-social responses and many more. Though the pandemic poses to be waning, it costs millions of lives throughout the world and it is uncertain, how it impacts the cardio-respiratory function among survivors in the long-term.

Long-COVID or post-COVID syndrome is an evolving entity comprising cardio-respiratory, musculo-skeletal and psychological symptom complexes persisting for months, even years after patients recovering from severe acute respiratory syndrome coronavirus type-2 (SARS-CoV-2) infections. Though, the initial treatment is predominantly symptomatic and reassuring, it is not established how it impacts health specially the cardio-respiratory functions in long-term.

Cardiac involvement in acute SARS-CoV-2 infection is common, can reach up to 78% cases<sup>1</sup> and include myocardial injury, myocarditis, arrhythmias, acute coronary syndrome and venous thromboembolism. Cardiac involvement can be severe and life-threatening to mild and even may pass asymptomatic. Patients with cardiac involvement during the acute SARS-CoV-2 infection have worse outcome than the cohort without cardiac involvement. Patients with prior cardiac disease

are reported to have severe COVID-19 with bad outcomes.<sup>2</sup> Among survivors of COVID-19, large proportions have cardiac manifestation of post-COVID symptoms. Survivors of mild to moderate COVID-19 without prior cardiac disease and without acute cardiovascular manifestation of COVID-19, significant proportion had subtle cardiac involvement, detected by detailed cardiac evaluation including echocardiography and cardiac magnetic resonance imaging.<sup>3</sup> This findings emphasize to follow up such cohorts for longer duration to enlist the outcome in long-term.

Respiratory features are the commonest presentations of COVID-19 and encompass a wide variety of symptoms; many display mild upper respiratory tract symptoms, however, some develop more severe illness, commonly viral pneumonia, acute respiratory distress syndrome (ARDS) leading to poor health outcomes and/or mortality. Respiratory symptoms may persist in half of the COVID-19 survivors, predominantly among patients with acute severe and critical cases.<sup>4-6</sup> Patients with pre-existing respiratory diseases and those with severe disease and extensive pulmonary involvement during the acute phase of COVID-19 have persistent respiratory symptoms. Widespread interstitial fibrosis is often detectable in survivors of COVID-19 with persistent respiratory symptoms.

Long-term health sequelae among COVID survivors are multi-dimensional.<sup>7</sup> Many patients have fatigue of post-viral asthenia and hormonal dysfunctions are frequently associated. Thyroid dysfunction is reported frequently<sup>8</sup> and needs careful assessment and monitoring.

In conclusion, long-term health-effects of COVID-19 are yet to be measured and described. However, onset of new symptoms among COVID-19 survivors are to be taken seriously, evaluated meticulously; patients should

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undergo selected and relevant investigations, patients should be reassured and treated symptomatically, as and when needed and a multi-disciplinary rehabilitation program is warranted.

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