



## Is Post-COVID-19 Cognitive Impairment a Reality? A Review

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COVID – 19 is an ongoing global pandemic caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), first identified in December 2019. Though respiratory symptoms are predominant for patients with COVID-19, it has been noted that they also suffer from neurologic and neuropsychiatric complications [1]. Histopathologic examinations of brains from deceased COVID-19 patients show that SARS-CoV-2 may infiltrate the central nervous system [1].

A detailed review of the COVID-19 literature reveals that many interacting factors cause neurological symptoms and sub-clinical cognitive dysfunction in the aftermath of COVID-19 infection. Direct damage to cortex and adjacent subcortical structures and indirect effects due to systemic impairment and psychological trauma is one factor [2]. Two possibilities for the involvement of the central nervous system could be: 1) hematogenous spread of SARS-CoV-2 from systemic circulation to cerebral circulation, where the slower flow is conducive to the virus damaging the capillary endothelium and gaining access to the brain and 2) dissemination through the cribriform plate and olfactory bulb [3].

COVID-19 causes a decrease in NO concentrations in the brain, which is expected to induce cognitive and behavioural disorders [4]. Another part of neurological consequences of this

viral infection is the executive function disturbance (“dysexecutive syndrome”) associated with frontal lobe pathology. The dysexecutive syndrome includes attention control defects, difficulties in planning, abstracting, behavioral control, and orientation [5]. Furthermore, encephalopathy has been frequently mentioned in cases of infections with COVID-19. It is known that encephalopathy is usually associated with generalized cognitive disturbances, including executive function disturbances [5]. Mechanical ventilation for acute respiratory distress syndrome (ARDS), can lead to long-term cognitive impairments, as hypoxia may lead to cerebral atrophy and ventricular enlargement. Survivors of ARDS, who have been on mechanical ventilation may develop neurocognitive symptoms in the long run [5]. It has been reported that even those who had a mild COVID-19 infection, continue to suffer from persisting or cyclical symptoms, such as chest pain and palpitations, shortness of breath, muscle and joint aches and pains, headaches, cognitive impairment (‘brain fog’), neuropathy and paraesthesia, and fatigue [6].

COVID-19 is also seen to produce potential risks to child development due to the risk of illness, protective confinement, social isolation, and the increased stress level of parents and caregivers. This may also lead to long-term impairment of cognition, mental and physical health, and working capacity of future adults [7]. So studies on the impact of COVID-19 on children and strategies to prevent damage to children’s growth and to promote positive development become necessary. Fear of infection-associated complications, prohibition of human contact, and uncertainty about reacceptance in society may jeopardize mental well-being and influence quality of life [8]. Psychological trauma due to loss of income, fear, death of friends and relatives, and the effect of COVID-19 on those with pre-existing cognitive issues like dementia and Alzheimer’s disease could also have an effect on cognitive impairment post COVID.

Observations from a literature search suggest that post-COVID-19 subjects may recover from respiratory tract symptoms, but the long-term effects of coronavirus infection on the brain and its consequences in terms of cognitive functioning remain to be studied [2].

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