



Letter to the Editor

Do COVID-19 infection among patients increase the risk of Alzheimer's disease?

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Dear Editor

The coronavirus disease 2019 (COVID-19) outbreak has occurred for more than ten months. Some COVID-19 complications are still unknown. Is there any long-term effect on the neurologic manifestations after COVID-19? Will the infected patient get a greater risk of Alzheimer's disease? May the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) have a long latency period in the central nervous system? If this is possible, it has various non-specific inflammatory diseases that initiate and re-activate certain inflammatory or oxidative reactions in Alzheimer's disease, but the neurological complications of COVID-19 are limited to individual cases or small case series according to several published papers [1].

Recently, **Varatharaj et al.** reported the neurological and neuropsychiatric complications of COVID-19 in 153 patients; who were divided into two groups, cerebrovascular and neuropsychiatric. 96% of patients with cerebrovascular events are also altered with mental status in the age range from 71 to 80. The results showed 43% of patients with neuropsychiatric disorders would have a new-onset psychosis such as neurocognitive, dementia, and Alzheimer's disease [2].

In fact, COVID-19 is the disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The virus could infect neurons from the brain affecting the connection and formation of synapses in building another 3D multicellular *in vitro* tissue [3]. There was a case about a patient with acute necrotizing encephalopathy in Japan as the SARS-CoV-2 found in cerebrospinal fluid lead to swelling and inflammation in brain tissues [4]. However, this is uncommon because the chance of blood vessel infection in the brain is small. The SARS-CoV-2 can't enter and bind to the brain cells through an angiotensin-converting enzyme 2 (ACE-2) protein receptor [5]. Thus, it seems to be impossible for the central nervous system to get an infection from the SARS-CoV-2.

Up to the present, most of the neurological damage is regarding the brain's blood, oxygen, and nutrient supply from the peripheral vessels.

cardiovascular and cerebrovascular diseases are frequently co-existed to cause Alzheimer's disease. There is not enough evidence supporting COVID-19 infection patients would increase the risk of Alzheimer's disease.

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All authors contributed to the concept, acquisition, and analysis of data, drafting of the article, and critical revision for important intellectual content.

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