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Letter to the Editor

Neuro-COVID Shows up in Various Ways in MRI of the Brain, Spine, Nerves, and Muscle

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We read with interest the narrative review by Ghaderi *et al.* about a literature review on the mechanism by which SARS-CoV-2 causes neurological symptoms and cognitive-behavioural changes^[1]. It was concluded that SARS-CoV-2 affects the central nervous system (CNS) and the peripheral nervous system (PNS) and that neuro-COVID can be substantiated by magnetic resonance imaging (MRI) of the brain, spine, peripheral nerves, and muscle^[1]. The review is excellent but has limitations that are cause of concerns and should be discussed.

The major limitation of the study is that a number of CNS and PNS complications of SARS-CoV-2 which show up on neuroimaging were not included in the review. CNS disorders complicating SARS-CoV-2 infections not addressed in the review include acute, hemorrhagic, necrotizing encephalitis (AHNE), cerebellitis, reversible cerebral vasoconstriction syndrome (RCVS); optic neuritis, pituitary apoplexia, hypophysitis, cerebral hypoxia, Bickerstaff encephalitis, cerebral vasculitis, opsoclonus myoclonus syndrome, limbic encephalitis, hypo- or hyperkinetic movement disorders, demyelinating disorders (multiple sclerosis, neuromyelitis optica (NMO) spectrum disorders, myelin-oligodendrocyte glycoprotein (MOG) associated disease), Wernicke encephalopathy, and sleep disorders. PNS disorders complicating SARS-CoV-2 infections not included in the review include Parsonage Turner syndrome, plexitis of the lumbosacral plexus, and rhabdomyolysis.

There is also no mention of several psychiatric disorders that can occur in connection with SARS-CoV-2 infections. These include mood disorders, isolated hallucinations, mania, akinetic mutism, eating disorders, or autism spectrum disorders.

Another limitation is that the search period was limited to November 2021 to February 2023^[1]. We should know why the literature published during the entire year 2020 and almost the entire year 2021 was not included in the review. During this excluded period, numerous articles were published on neuroimaging findings in patients with neuro-COVID or psycho-COVID, therefore important information and data may have been missed and the review may therefore be incomplete.

In summary, the interesting study has limitations that put the results and their interpretation into perspective. Addressing these issues would strengthen the conclusions and could improve the status of the study. Neuro-COVID shows up in various ways in MRI of the brain, spine, nerves, and muscle. Extensive literature studies are required to discuss all of the literature on the subject.

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Keywords: Brain, Spine, SARS-CoV-2, COVID-19, MRI

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1. Ghaderi S, Olfati M, Ghaderi M, Hadizadeh H, Yazdanpanah G, Khodadadi Z, *et al.* Neurological manifestation in COVID-19 disease with neuroimaging studies. *Am J Neurodegener Dis.* 2023; 12(2):42-84.