

All Hyperkinetic and Hypokinetic Movement Disorders can Complicate SARS-CoV-2 Infections

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LETTER TO THE EDITOR

We read with interest Pillai *et al.*'s systematic review on de novo movement disorders after a SARS-CoV-2 infection [Pillai, K. S. *et al.*, 2023]. From 82 articles, 133 patients with SARS-CoV-2-associated movement disorder were identified and analysed [Pillai, K. S. *et al.*, 2023]. The most common movement disorder was mixed movement disorder, occurring in 41% of patients and among these, myoclonus ataxia syndrome was the most common [Pillai, K. S. *et al.*, 2023]. Tremor was the movement disorder with the longest period between SARS-CoV-2 infection and the onset of the movement disorder [Pillai, K. S. *et al.*, 2023]. At short-term follow-up, myoclonus improved, while Parkinson syndrome and tremor persisted [Pillai, K. S. *et al.*, 2023]. The study is impressive but some points require discussion.

The main limitation of the study is that various movement disorders were not taken into account and included in the analysis. Tardive dyskinesias, tics, including Tourette syndrome, athetosis, mannerisms, stereotypies, and restless-leg syndrome are absent [Nakamura, I. *et al.*, 2021]. Tardive dyskinesia is a common complication of long-term treatment with neuroleptics, but has also occasionally been reported in association with SARS-CoV-2 infections and wearing a face mask [Akhoundi, F. H. *et al.*, 2022]. In a study of 472 patients with post-acute COVID-19 syndrome, tics were significantly more frequent in COVID-19 patients compared to healthy controls [Albtoosh, A. S. *et al.*, 2022].

Another limitation is that the coincidental occurrence of movement disorder and SARS-CoV-2 infection has not been discussed in detail. Some of the movement disorders may have been subclinical or mild before the onset of a SARS-CoV-2 infection, or may have a genetic cause. Some of them even have positive family histories. It is therefore imperative that a detailed family

history be taken from all patients with a possible hereditary disease in order to assess whether the respective movement disorder only occurred coincidentally together with the SARS-CoV-2 infection.

A third limitation is that it was not discussed how many of the included patients were or were not vaccinated with one of the anti-SARS-CoV-2 vaccines. Knowing the number of patients is important because anti-SARS-CoV-2 vaccinations have been repeatedly reported to trigger the development of various movement disorders [Dulski, J. *et al.*, 2023].

A fourth limitation is that myoclonus due to epileptic activity was not taken into account. Myoclonus can be not only a subcortical disease, but also a cortical one. Therefore, we should know how it was concluded that patients with myoclonus did not have epilepsy but rather a movement disorder. Were EEG recordings performed on all patients with myoclonus?

A fifth limitation of the study is that cerebral imaging, cerebrospinal fluid analysis, and EEG data were not reported or discussed. Since movement disorders can be a complication of other central nervous system diseases, it is important to exclude that movement disorders in the included patients have developed as a result of a central nervous system disorder such as stroke, bleeding, encephalitis, meningitis, ADEM, AHLE, AHNE, or ANE

In summary, the interesting study has limitations that put the results and their interpretation into perspective. Clarifying these weaknesses would strengthen the conclusions and could improve the study. Movement disorders are a common complication of SARS-CoV-2 infections. All types of movement disorders, hyperkinetic and hypokinetic, can complicate SARS-CoV-2 infections.

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