

## Letter to the Editor

**Long-COVID syndrome requires extensive diagnostic work-up****Josef Finsterer<sup>1\*</sup>, Carla Alessandra Scorza<sup>2</sup>, Fulvio Alexandre Scorza<sup>3</sup>, Ana Claudia Fiorini<sup>4</sup>**<sup>1</sup> MD, PhD Neurology & Neurophysiology Center, Vienna, Austria<sup>2, 3</sup> Disciplina de Neurociência. Universidade Federal de São Paulo/Escola Paulista de Medicina (UNIFESP/EPM). São Paulo, Brasil<sup>4</sup> Programa de Estudos Pós-Graduado em Fonoaudiologia, Pontifícia Universidade Católica de São Paulo (PUC-SP), Brazil; Departamento de Fonoaudiologia, Escola Paulista de Medicina/Universidade Federal de São Paulo (EPM/UNIFESP), São Paulo, Brazil\* Corresponding Author: **Josef Finsterer****Article Info****ISSN (online):** 2582-7138**Volume:** 04**Issue:** 01**January-February 2023****Received:** 21-01-2023;**Accepted:** 13-02-2023**Page No:** 609-610**DOI:** <https://doi.org/10.54660/IJMRGE.2023.4.1.609-610>**Keywords:** COVID-19, SARS-CoV-2, long-COVID, myocarditis, neuropsychology**Introduction**

We read with interest the article by Warren *et al.* on a 56 years-old female who developed cognitive impairment after a mild infection with SARS-CoV-2 manifesting with loss of smell and taste, fatigue, impaired concentration, exertional dyspnoea, and exertional tachycardia<sup>[1]</sup>. After these manifestations had persisted for five months, extensive work-up revealed an MMSE of 30/30, normal cerebral MRI, and normal electroencephalography (EEG)<sup>[1]</sup>. Neuropsychological testing however, revealed deficits in attention, processing speed, executive control, fine motor dexterity, learning, and memory<sup>[1]</sup>. Donepezil was tried with limited benefit<sup>[1]</sup>. Follow-up neuropsychological testing after one year demonstrated improvement in attention and flexibility but abnormal memory and semantic fluency remained unchanged<sup>[1]</sup>. The study is appealing but raises concerns that should be discussed.

The main shortcoming of the study is that work-up for cerebral involvement in COVID-19 was incomplete. Although the patient had undergone cerebral MRI, it was not mentioned which modalities were applied. Therefore, we should know if diffusion-weighted imaging (DWI), apparent diffusion coefficient (ADC) maps, susceptibility-weighted imaging (SWI), perfusion-weighted imaging (PWI), MR-angiography (MRA), and MR-venography (MRV) were truly normal on repeated investigations. It should be also clarified if the patient had undergone cerebro-spinal fluid (CSF) investigation to assess if cytokines, chemokines and glial markers were normal or increased in the CSF. Missing are also functional studies of the brain by means of single-photon emission tomography (SPECT) and positron emission tomography (PET) studies.

Interestingly, the patient was diagnosed with myocarditis but it is not mentioned if myocarditis was detected during the acute stage of the SARS-CoV-2 infection or during the post-COVID period.

Furthermore, it was not mentioned upon which criteria myocarditis was diagnosed. Particularly unclear remains if the patient had undergone cardiac MRI with contrast medium, endo-myocardial biopsy, or both to establish the diagnosis myocarditis. It was also not mentioned if creatine-kinase, troponin-C, and pro-brain natriuretic peptide (pro-BNP) were elevated and if the electrocardiogram (ECG) was abnormal or not. Because myocarditis can go along with heart failure and supra- or ventricular arrhythmias and thus cardio-embolism, it is crucial at which time point the diagnosis was established, upon which criteria, and what therapy the patient received. Missing are the results of echocardiography. We should be told if follow-up cardiologic investigations were normal or not.

There is also no mentioning if pulmonary embolism, pulmonary hypertension, heart failure, systolic dysfunction, and neurogenic pulmonary edema, were truly ruled out in the index patient. Missing are also the results of long-term ECG recordings, which are required for the work-up of exertional dyspnoea and tachycardia. Only if all these tests are normal a functional or psychiatric origin of the described abnormalities can be assumed.

Overall, the interesting study has limitations that call the results and their interpretation into question. Clarifying these weaknesses would strengthen the conclusions and could improve the study. Diagnosing long-COVID syndrome with cerebral and cardiac manifestations requires extensive cerebral and cardiac investigations.

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### References

1. Warren S, Drake J, Wu CK. Cognitive Complications of COVID-19 Infection. *R I Med J* (2013). 2022 Sep 1; 105(7):27-30.