Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Clinical Neurophysiology 132 (2021) 2324–2325

Contents lists available at ScienceDirect

Clinical Neurophysiology

journal homepage: www.elsevier.com/locate/clinph

Letter to the Editor

Exclude differentials before attributing post-COVID fatigue to myopathy

With interest, we read Agergaard et al.'s study of 20 patients with COVID-19 and persistent neuromuscular symptoms who were investigated by means of nerve conduction studies (NCSs) and needle electromyography (EMG) (Agergaard et al., 2021). It was concluded that myopathy may be an important cause of physical fatigue in long-term COVID-19 patients (Agergaard et al., 2021). The study is appealing but raises comments and concerns.

We do not agree with the introductory statement that the peripheral nervous system (PNS) is affected in only 5% of COVID-19 cases (Agergaard et al., 2021), considering that anosmia/hyposmia and ageusia/hypogeusia reflect involvement of cranial nerves and that these symptoms are reported in up to 50% of affected patients (Weinbergerova et al., 2021). Additionally, it should be considered that not only Guillain-Barre syndrome (GBS) (Finsterer and Scorza, 2021) but other neuropathies are increasingly recognised as complications of COVID-19 and mainly attributed to side effects of neurotoxic drugs given for the treatment of COVID-19 or long-term ICU treatment (critical illness neuropathy, compartment syndrome, compression neuropathy). However, we acknowledge that this information was not yet published at the time the index study had been accepted.

Furthermore, fatigue should not only be attributed to involvement of the skeletal muscle. Fatigue may be due to central nervous system (CNS) involvement, PNS involvement, cardiac involvement, renal dysfunction, lung disease, and depression. Since fatigue and exercise intolerance are multifaceted, investigations of all other potential organs/systems affected by SARS-CoV-2 and potentially responsible of fatigue are warranted.

Another study limitation is that the EMGs were performed up to 8 months after the COVID-19 infection. Thus, it is crucial that causes of myopathy occurring during the latency between the COVID-19 infection and the electrophysiological investigations were considered. We should also be told which exclusion criteria were used, as three patients were excluded from the current study (one with diabetic neuropathy and 2 with a history of ICU treatment).

A further limitation is that the cause of the myopathic EMG in 11 patients is not well explained. Only one patient with myopathic EMG had mild creatine-kinase elevation. Lactate was not provided. No follow-up data, particularly no follow-up EMGs, were provided. There are indications that SARS-CoV-2 may be complicated by dermatomyositis (Borges et al., 2021). We should be told how dermatomyositis was excluded in the one patient with elevated ESR. Also missing is a comprehensive analysis of medications the included patients received for COVID-19. Since some of these drugs are myotoxic, it is crucial to present the detailed drug history. Myotoxic drugs in addition to chloroquine and steroids include ritonavir or lopinavir, which may cause myopathy or rhabdomyolysis, and azithromycin, which may cause rhabdomyolysis (risk ratio: 2.94) (Finsterer and Scorza, 2020).

Overall, the interesting study has several limitations which challenge the results and their interpretations. Addressing these concerns may strengthen the conclusions.

Ethical approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Availability of data and material

All data reported are available from the corresponding author.

Funding

None received.

CRediT authorship contribution statement

Josef Finsterer: Conceptualization, Data curation, Formal analysis, Methodology, Validation, Visualization, Writing - original draft. **Fulvio A. Scorza:** Validation, Writing - review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

None.

https://doi.org/10.1016/j.clinph.2021.06.018

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Accepted 21 June 2021

Available online 17 July 2021