Received: 8 June 2022 | Accepted: 11 August 2022

DOI: 10.1111/ene.15524

european journal of neurology
the official journal of the european academy of neurology

LETTER TO THE EDITOR

# Post-COVID myopathy

Dear Editor,

We read with interest the article by Hejbøl et al. on a study of 16 patients undergoing muscle biopsy for post-COVID fatigue, myalgia, or weakness [1]. Half of the patients presented with muscle weakness, 75% had myogenic electromyography (EMG), and all had abnormal biopsies, such as fiber atrophy, fiber regeneration, mitochondrial changes, inflammatory changes, or basal lamina thickening [1]. The study is appealing but raises concerns that should be discussed.

A limitation of the study is that no mention was made of the medication the patients were taking for COVID-19. Because some of the compounds commonly administered to COVID-19 patients, such as steroids, chloroquine, tocilizumab, or remdesivir (particularly in combination with steroids or statins), can be myotoxic [2], it is important to be aware of the drugs these patients were receiving for COVID-19.

Because COVID-19 can be complicated by rhabdomyolysis [3], we should know how many of the 16 patients developed rhabdomyolysis during the acute SARS-CoV-2 infection.

Post-COVID syndrome is frequently characterized by depression, physical inactivity, easy fatigability, depression, and tiredness. In how many of the patients were the clinical, EMG, and bioptic findings attributable to nonuse of the muscles? We should be informed whether all included patients were as physically active as before the SARS-CoV-2 infection.

It is known that SARS-CoV-2 infections can be complicated by emergence or exacerbations of myasthenia [4]. We should be told in how many of the 16 included patients clinical, blood chemical, EMG, and bioptic findings were due to myasthenia. Were antibodies against acetylcholine receptors or antibodies against muscle-specific kinase positive in any of the included patients?

Fatigue in post-COVID patients may be due not only to muscle involvement but also to cerebral involvement in the acute infection [5]. We should be told how many of the enrolled patients had clinical signs of central nervous system (CNS) involvement and how many showed cerebral magnetic resonance imaging CNS pathology that could explain fatigue.

According to the abstract, muscle weakness was present in 50% of cases [1]. However, according to Figure 1, only seven of 16 patients (43.7%) had muscle weakness. This discrepancy should be resolved.

A limitation of Figure 1 is that it lacks reference limits. Knowing the reference limits is crucial to assess which values are normal and which are abnormal. According to our own reference limits, only one patient had elevated creatine kinase.

EMG results lack interference pattern analysis. We should be told in how many patients the interference pattern amplitude was reduced and in how many a dense interference pattern was already present at little effort.

Because 10 patients had abnormal mitochondrial morphology, we should be informed whether serum lactate was elevated in these patients. It would be also interesting to know whether biochemical investigations of respiratory chain complex functions were performed in any of the patients with abnormal mitochondrial morphology.

Overall, the interesting review has some limitations that call the results and their interpretation into question. Clarifying these weaknesses would strengthen the conclusions and could enhance the study.

## AUTHOR CONTRIBUTIONS

**Josef Finsterer:** Data curation (equal); formal analysis (equal); investigation (equal); resources (equal); writing – original draft (equal). **Fulvio Alexandre Scorza:** Formal analysis (equal); investigation (equal); supervision (equal).

## KEYWORDS

muscle, myopathy, myositis, rhabdomyolysis, weakness

## CONFLICT OF INTEREST

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## DATA AVAILABILITY STATEMENT

All data are available from the corresponding author.

## ETHICAL APPROVAL

Ethical was in accordance with ethical guidelines. The study was approved by the institutional review board.

## CONSENT FOR PUBLICATION

Consent was obtained from the patient.

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