

LETTER TO EDITOR

# Neurological Manifestations of COVID-19 Patients and Management

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SARS-CoV-2 was first observed in Wuhan, China, and quickly spread throughout the world, proclaimed as a pandemic by WHO. Most reported cases have respiratory symptoms, but many cases are seen with neurological signs as initial or related presentations [1].

With the flow of time, massive data on various aspects of the disease, such as manifestations, pathology, transmission, prevention, and management strategies, has begun to emerge [2,3]. Myalgia and fatigue, dizziness, headache, anosmia, ageusia, and altered mental status are relatively common in Covid patients with preexisting comorbidities [4]. Also, known risk factors associated with neurological symptoms include advanced age, heart failure, coronary artery disease, hypertension, dyslipidemia, diabetes mellitus, obesity, chronic obstructive pulmonary disease, asthma, chronic renal failure, liver disease, malignancy, smoking, immunosuppression [5].

Aerosol droplets penetrate the nasal mucosa of COVID-infected patients; travel through the cribriform palate into the Central Nervous System (CNS). Then it spread to the CNS through the direct invasion of the virus and produces neurological signs [6]. In up to 25% of COVID-19 cases, manifestations of Central Nervous System (CNS) involvement have been reported [4]. Other neuroinvasion mechanisms involve transsynaptic transfer via infected neurons, direct entry through the olfactory nerve, infected vascular endothelium, or leukocyte migration through the blood-brain barrier, cytokine storm, immunological causes, hypoxic brain injuries, often several drug side effects are also identified [6]. In a retrospective study of the clinical characteristics of 113 COVID-19 patients from China, Chen, et al. [7] discovered hypoxic encephalopathy in 20 of them. Moriguchi, et al. [8] from Japan reported the first confirmed case of COVID-19-associated viral meningoencephalitis. Several cases of CVST associated with COVID-19 have been reported. The increased risk of arterial ischemic stroke or CVST in SARS-CoV-2 infection suggests a pro-coagulant state, which could be caused by either blood flow stasis, particularly in critically ill and immobilized patients, or hypercoagulability [9]. According to a Bangladeshi study, the most common neurological diagnosis in the Covid-19 was stroke [29(54.71%)], subdural empyema [1(1.88%)], meningo-encephalitis [15(65.21%)],

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Guillain-Barre syndrome [3(5.66%)], and so on [10]. A systematic analysis of 554 COVID-19 patients revealed that the mean prevalence of headache was 8% (95% CI 5.7-10.2%), and the prevalence of dizziness was reported to be between 7 and 9.4% [11]. Cohort study-reporting of a stroke in 2-6% of patients diagnosed with COVID-19 [11]. Stroke identified with a pro-inflammatory hypercoagulable state with elevated D-dimer, ferritin, and C-reactive protein.

**Management during pandemic [12]:**

- Routine COVID-19 antiviral management, if indicated.
- Symptomatic Supportive treatment of headache, neuropathic pain, and anxiety.
- Management of risk factors.
- Antiviral agents, anti-thrombotic and anti-inflammatory medications are used as an indication.
- Stroke therapy with the possible use of Intravenous Thrombolysis (TPA) or Endovascular Treatment (EVT) with mechanical thrombectomy in COVID-19 patients.
- Steroids, IV immunoglobulins (later).
- Selective cytokine blockade with inhibition of anakinra, tocilizumab, or Janus Kinase (JAK).
- Some antiviral and CNS drugs show drug interactions, so the risk-benefit should be measured before prescribing.
- The introduction of the protection bundle advocated by the Society of Critical Care Medicine (SCCM) in its management of the ICU shows benefits [13].
- Expert consensus statements from the European Academy of Neurology (EAN) indicate a strong response rate to direct neurologists [14].

COVID-19 can cause a wide range of neurological manifestations. Prompt recognition and treatment will help to reduce its complications. Although neurological manifestations are common in severe cases, patients with pure neurological manifestations at the onset of COVID-19 illness should be treated with caution.

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