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Spectrum of Neuropsychiatric Manifestations and Associated Factors of COVID-19 in Epidemic Treatment Centers (CTEPI) in Guinea

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ABSTRACT

Introduction: *COVID-19 disease has spread worldwide since December 2019. Neurological symptoms have been reported as part of the clinical spectrum of the disease. The aim of this study was to describe the neuropsychiatric manifestations of neuro COVID in tropical settings.*

Methods: *This was a cross-sectional, multicenter study lasting 6 months on patients hospitalized in the CTEPI of Gbessia and Champ Alpha Yaya Diallo in Conakry. All patients presenting with neurological symptoms in the days following SARS COV2 infection were included in the study according to the neuroCOVID diagnostic criteria. All patients with comorbidities (hypertension, diabetes, HIV, tuberculosis of the nervous system) were excluded.*

Results: *Of 350 patients hospitalized with COVID-19; 267 patients (76.3%) developed at least one neurological symptom with a mean age of 44.5 years. Neurological signs were dominated by headache (67.4), anosmia (51.2%), ageusia (45%), impaired vigilance (11.2%), hemiplegia (5.2%), paresthesias (1.5%) and paraparesis (1.5%). Stroke was found in 24 patients (9%); 13 patients (4.9%) had encephalitis. Thirteen patients (4.9%) developed peripheral neuropathies and 4 (1.5%) had Guillain-Barré syndrome.*

Conclusion: *In our series, more than half of the patients presented some form of neurological symptom related to cases of COVID-19 infection. Further studies are needed for a better understanding of the mechanisms of neurological involvement of SARS-CoV-2.*

Keywords

Neurological manifestations, COVID-19, frequency, stroke, Guinea.

Introduction

Coronavirus disease is caused by SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2), a zoonotic pathogen that can infect humans [1,2]. Named COVID-19 by the WHO, it was declared a pandemic on March 11, 2020 with more than 80 million cumulative cases in 2020 and 1.8 million deaths worldwide [2]. Common manifestations of the disease include respiratory tract and associated systemic manifestations [3]. Accumulating evidence suggests that SARS-CoV-2 also infects other organs including the nervous system. Neurological manifestations include a variety of entities [1,4], including cerebrovascular accidents (CVA), encephalopathies, neuroinflammatory disorders such as encephalitis, myelitis and acute disseminated encephalomyelitis, as well as Guillain-Barré syndromes [5]. The prevalence of neurological manifestations varies from study to study, in China, Mao et al. [6] reported severe neurological manifestations such as stroke in 5.7% of patients, impaired consciousness in 14.8% of patients and skeletal muscle damage in 19.3% of patients. In France, in 2021, Meppiel et al. [5] reported that COVID-19-associated encephalopathy was the most common neurological

pathology (30.2%), followed by ischemic vascular accident (IVCA) (25.7%), encephalitis (9.5%), and Guillain-Barré syndrome (6.8%). In Egypt, in 2021, El Nahas et al. [7] reported 10 patients with cerebrovascular manifestations a few days after having COVID-19. Although in Guinea, Atakla et al. [8] reported in an observational study of 4 cases of IVCA due to COVID-19, it is a neurological condition that is often described mainly in tropical settings. The lack of data on the association of COVID-19 and the nervous system limits the understanding of the clinical characteristics of this new disease in our context. Thus, the objective of this study was to describe the neuropsychiatric manifestations of neuro COVID in tropical settings.

Methods

This was a multi-center cross-sectional study of patients hospitalized in the epidemic treatment centers (CTEpi) of Gbessia and Alpha Yaya Diallo camp, from December 1, 2021 to May 1, 2022. The diagnosis of COVID 19 was made on the basis of a positive PCR test for SARS-Cov-2performed on a nasopharyngeal sample or a chest CT scan showing lesions typical of COVID 19. We included all patients diagnosed with COVID 19 who presented with neurological symptoms. Patients with comorbidities (hypertension, diabetes, HIV, tuberculosis of the nervous system) were excluded. For each patient, the data collected were distributed as follows:

Epidemiological characteristics: included age, sex, comorbidities (high blood pressure, diabetes, chronic heart disease, chronic lung disease, tuberculosis, malnutrition, HIV infection, stroke) andand COVID-19 vaccination status.

Clinical features: were grouped into neurological symptoms (headache according to the criteria of the International Headache Society), impaired vigilance, hemiplegia, anosmia, ageusia, mental confusion, paresthesias, paraparesis) and neuropsychiatric symptoms (anxiety, psychomotor agitation, anxiety, and insomnia). Neurological diseases included clearly identifiable clinico-radiological syndromes; Stroke was defined as a focal or global neurological deficit with lesions on brain imaging (brain CT/MRI) specific to a vascular lesion.

Encephalitis: Patients with encephalitis all underwent a lumbar puncture with CSF analysis, the presence of a CSF white blood cell (WBC) count < 5/mm³ or a specific lesion on brain imaging was sufficient to make this diagnosis. Guillain-Barré syndrome: The diagnostic criteria for Guillain-Barré syndrome developed by the National Institute of Neurological Disorders and Stroke (NINDS) were used to make this diagnosis [9]. Cranial neuropathies have been described as oculomotor palsy or peripheral facial paralysis. The collected data was reviewed, coded, on Kobocollect. The mean was expressed for quantitative variables and qualitative variables were expressed as frequency.

Ethical considerations: The ethics committees of the CTEpi of Gbessia and Camp Alpha Yaya of Conakry approved the study. The identity of the patients and the confidentiality of the information were preserved.

Results

Of 350 COVID-19 patients consulted during the study period, 267 presented neurological manifestations with a frequency of 76.3%.78 patients (36.8%) had severe COVID and required hospitalization in intensive care. The average age of the patients was 44.5 years (range: 18 to 97 years), 66 patients (24.7%) were between 18 and 27 years old,5 patients (20.6%) were aged between 28-37 years. We noted a male predominance of 54.7% with a sex ratio of 1.3). Out of two hundred and twenty-five patients (84.3%) had not received any vaccines, 25 patients (9.4%) had received the AstraZeneca vaccine, 10 patients (3.6%) the Sinopharm vaccine, the other vaccines used were Pfizer (1.1%), Johnson & Johnson (0.7%) and Sputnik (0.7%) (1). Headaches were found in 180 patients (67.4%), 30 patients (11.2%) had impaired vigilance, and motor deficit was present in 18 patients (6.7%) [14 patients (5.2%) with hemiplegia and 4 patients (1.5%) with paraplegia]. Anosmia and ageusia were found in 150 patients (51.2%) and 120 patients (45%), respectively. Neuropsychiatric manifestations were dominated by anxiety in 29 patients (10.9%), insomnia in 15 patients (5.5%) and anxiety (4.4%). Stroke was found in 24 patients (9%) or 17 patients with a VACI (6.4%) and 7 patients with a VACH (2.4%). Thirteen patients (4.9%) had peripheral neuropathy, 4 patients (1.5%) had Guillain Barré syndrome. Peripheral facial paralysis was found in 2 patients (0.7%).

Discussion

Although having a respiratory tropism, human coronaviruses are also associated with various more or less severe neurological disorders, such as encephalitis, encephalomyelitis, Guillain-Barré syndrome, anosmia, or acute encephalopathies [10]. The high frequency of neurological symptoms during COVID-19 (76.3%) in our study raises the question of a potential neurotropism and neurovirulence of SARS-CoV-2. In previous studies, neurological symptoms were noted in up to 84% of patients hospitalized in intensive care [1,2]. The prevalence of patients admitted to intensive care (63.2%) in our study is different from that found by Donamou et al. [11] who found 140 admissions (2.3%) to intensive care. This difference would be justified by the fact that the damage to the nervous system constitutes for the most part signs of severity during COVID 19 and on the other hand our study focused only on patients with damage to the nervous system. The young age of our patients (average age of 44.5 years) is explained by the fact that Guinea has a predominantly young population of which 55.5% are under 20 years old and 6 out of 10 people are under 25 years old reference [12].

The male predominance (sex ratio of 1.3) found was similar to that of Wang et al. [13] who found a male predominance of 54.3% (sex ratio of 1.2). On the other hand, it is different from that of Mao et al. [6] who reported a 59.3% female predominance (sex ratio of 0.69). This male predominance found in our study could be justified by the fact that men would be more exposed to SARS-CoV-2 due to their professional activities in our context.

In our series, 42 patients (15.7%) had been infected with SARS-CoV-2 after receiving a dose of vaccine. This result is higher than

that of Arslan et al. [14] who reported 0.08% (27/32,607) patients infected after receiving a vaccine and Arslan et al. [15] who found reinfection in 0.7% of patients after vaccination. These differences are explained by the fact that during our study period, there was a resurgence of new positive cases due to the delta variant, but also by the fact that some of our patients had not received a full dose of COVID-19 vaccine. The neurological symptoms reported in our study are different from those reported by Donamou et al. [11], who found a frequency of 97% of impaired vigilance and 73% of headaches. On the other hand, Kacem et al. [16] found 41.1% headache, 37.9% anosmia, 36.8% ageusia. In several studies, anosmia was reported in 59.2% of patients and ageusia in 50.8% of patients. These two signs were more frequently reported in COVID-19 patients with mild or moderate course (65.0% and 66.0%, respectively) [17]; which is consistent with our results. Neuropsychiatric signs such as anxiety and insomnia were reported by Romero-Sanchez et al. [18] in 167 (19.9%) patients, insomnia was the most common symptom, followed by anxiety, depression and psychosis. Oliveira et al. [19] reported that 2.6% of patients suffered from insomnia. Ischemic stroke (4.9%), encephalitis (4.5%), hemorrhagic stroke (2.6%) were found in different proportions than Mao et al. [6] who found 2.8% (6/214) of stroke including 4 (66.7%; 4/6) patients with cerebral infarction and 2 (33.3%; 2/6) with parenchymal hemorrhage). Meppiel et al. [5] reported that 38.3% of patients had encephalopathy, 28.4% had stroke and 9.5% had encephalitis. This difference is explained by the fact that during our study, brain imaging was not carried out systematically when neuro-COVID was suspected.

The prevalence of GBS (1.5%) is lower than that of a surveillance study in the United Kingdom [20], where GBS and its variants accounted for 21% of reported cases. Meppiel et al. [5] reported 14 patients with GBS in their study. Most cases of Guillain-Barré syndrome are serial. Thus, three cases of Miller Fisher syndrome, two cases of cranial polyneuritis, and six cases of isolated oculomotor neuropathy have also been described [21].

Conclusion

This study reveals in summary that neurological symptoms can be linked to cases of COVID-19 infection. In our series, more than half of the patients presented with some form of neurological symptom. Neurologist clinicians should be involved in the management in CT-Epi for the early diagnosis of severe forms. The mechanisms and consequences of neurological involvement of SARS-CoV-2 require further studies. Recognition and understanding of these different entities and their underlying pathological mechanisms are important to improve the clinical management of COVID-19 patients with neurological manifestations.

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