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SARS-COV-2 induced Parkinsonism: The first case from the sub-Saharan Africa

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Dear Editor,

Viral Parkinsonism is often linked with global pandemics causing encephalitis and movement disorders such as Parkinsonism [1]. The acute manifestations of COVID 19 encephalitis are often related to an adverse consequence of cytokine storm massively disrupting the blood-brain barrier resulting in heterogeneous neurological manifestations; one of which is post-infectious immune mediated Parkinsonism [1,2]. Likewise, we are observing cases of Parkinsonism among patients infected with Severe Acute Respiratory Syndrome-Coronavirus-2 (SARS-CoV-2) [2]. To date only three cases of SARS-CoV-2 associated Parkinsonism have been reported [3–5] (Table 1). The role of neuro-inflammation in PD has been well studied. Excessive activation of microglial cells were associated with progressive neurodegeneration of dopaminergic neurons, which resulted in PD [6]. To the best of our knowledge this is the first case of SARS-COV-2 associated Parkinsonism reported from the sub Saharan Africa.

We report a previously healthy 35-years-old female, with no prior history of prodromal symptoms of Parkinson's disease (PD); who presented with one week history of fluctuating mentation and abnormal behaviour, fever, and visual hallucination. Patient reported no history of cough, shortness of breath, abnormal body movement, or exposure to carbon monoxide or other toxins. Examination showed reduced mentation with Glasgow coma scale of (GCS) 13/15 and blood pressure (BP) 130/80 mmHg, pulse rate (PR) 110 beat per minute, respiratory rate (RR) 18 bpm, temperature range 38^{O}C, and partial pressure of oxygen (SPO2) 94% on atmospheric air. The patient was admitted to intensive care unit (ICU) with consideration of viral encephalitis and started with intravenous (IV) acyclovir. Serology tests for HIV, syphilis, hepatitis B & C was negative. On the third day of ICU admission, the nasopharyngeal SARS-COV-2 PCR test showed positive result. Brain magnetic resonance images (MRI) showed symmetrical non-enhancing, T1 isointense, T2 and FLAIR hyperintense lesions with no diffusion restriction in both pallidal regions (Figs. 1 and 2). Cerebrospinal fluid (CSF) analysis was non-revealing including a negative SARS-COV-2 PCR test. Subsequently, the patient was transferred to COVID isolation and started on dexamethasone 6 mg IV four times per day. On the third day of steroid therapy, the patient's neurological symptoms started improving and the patient become responsive and communicative. As the patient's mentation started clearing, we have observed features of Parkinsonism such as: right hand resting tremor, bradykinesia, jaw-closure type oromandibular dystonia, facial hypomimia, hypophonia, and drooling of saliva. On day 7 after ICU admission, the patient was started on Levodopa 250 mg/carbidopa 25 mg half tablet three times per day and encouraged the patient to ambulate. On subsequent days, the patient's condition significantly improved including features of Parkinsonism. After staying two weeks in the COVID isolation ward, the patient tested negative for nasopharyngeal SARS COV-2 PCR and discharged home improved with follow up appointment with a plan to continue dopamine replacement therapy and physical rehabilitation at home. On follow up evaluation, the patient clinical conditions were significantly improved and she has started her regular work.

The present case describes, a patient with features of SARS-COV-2 encephalitis/ or encephalopathy and Parkinsonism with MRI evidences of Bi-pallidal T2/FLAIR hyperintensity. Furthermore, the patient had no respiratory symptoms or history of hypoxic-ischemic insult or carbon monoxide poisoning which often associated with similar MRI features. Nonetheless, we speculated that our patient may have suffered from a silent hypoxia causing symmetrical pallidal lesions and Parkinsonism; considering the unique susceptibility of the basal ganglionic neurons to even transient anoxia [2]. Furthermore, the SARS-COV-2 its self has higher predilection for the dopaminergic neurons in the basal ganglia; likely because of their higher metabolism [2].

To date, very few cases have been reported on COVID associated Parkinsonism [3–5]. Contrary to the previously reported similar cases, respiratory symptoms were absent in the present case. Furthermore, in this case, the brain MRI shows Bipallidal lesion, whereas all the three cases reported previously had a normal brain imaging. However, the present case has a limitation regarding lack of DAT SPECT study, because of the lack of availability of the test in Ethiopia (Table 1). A contribution of viral infection such as COVID 19 in the pathogenesis of Parkinsonism is likely by implication, of viral-mediated neuro-inflammation and α-synucleinopathy, and a relative increased vulnerability of the dopaminergic neurons [7]. However, the potential role of the SARS-COV-2 infection in the pathogenesis of Parkinsonism and Parkinson's disease should be a focus of future scientific study. The present case presented with predominantly features of akinetic rigidity,

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Table 1
SARS-COV-2 associated Parkinsonism cases.

	Authors	Age/ sex	Country	Respiratory symptoms	Neurological & GI symptoms	Parkinsonism features	Involved side	Prodromal symptoms	Anoxic insult	CSF SARS-COV-2 PCR	Brain MRI	DAT SPECT	Treatment	Outcome
1	Cohen et al. 2020	45/ M	Israel	Cough, SOB, chest pain, & no fever	Anosmia & No encephalitis	Hypophonia, cogwheel rigidity, mild postural instability, & legs tremor	Right more than left	None	None	Anti SARS-CoV-2 IgG was negative from CSF	Normal	Bilateral decreased DA uptake in putamens (left more than right)	Pramipexole	Improved
2	Mendéz-Guerrero et al. 2020	58/ M	Spain	Cough, SOB, & fever	Hyposmia, myoclonus, reduced mentation, & opsoclonus,	Tremor, cogwheel rigidity, & hypokinesia	Right	None	Yes	Negative	Normal	Bilateral decreased DA uptake in putamens (left more than right)	No treatment	Improved
3	Faber et al. 2020	35/F	Brazil	Cough, sneezing, & rhinorrhea	Anosmia, Paresthesia, & no encephalitis	Cogwheel rigidity, bradykinesia, postural instability, hypophonia, & stooped posture	Right more than left	None	None	Not done	Normal	Decreased DA uptake in left putamen	Levodopa/ benserazide	Improved
4	Ayele et al 2021	35/F	Ethiopia	None except fever	Hyposmia & encephalitis	Facial hypomimia, tremor, cogwheel rigidity, bradykinesia, & postural instability	Right more than left	None	None	Negative	Bi pallidal lesion	Not done	Levodopa/ carbidopa	Improved

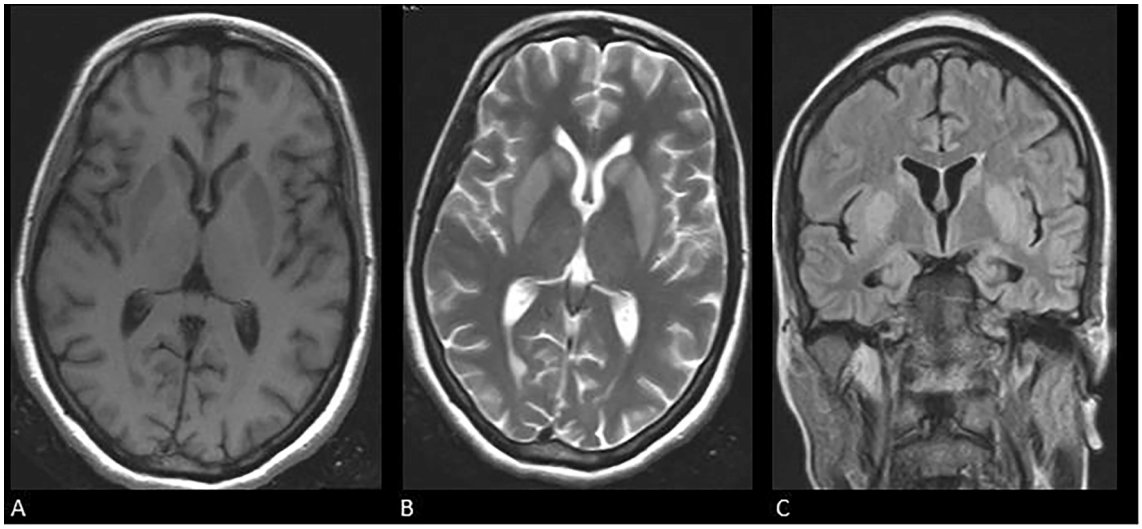

Fig. 1. Axial T1 MRI showing Bipallidal hypointense lesion (A); axial T2 sequence showing hyperintense lesion in bilateral basal ganglia region (B); and coronal FLAIR showing hyperintense Bipallidal lesion (C).

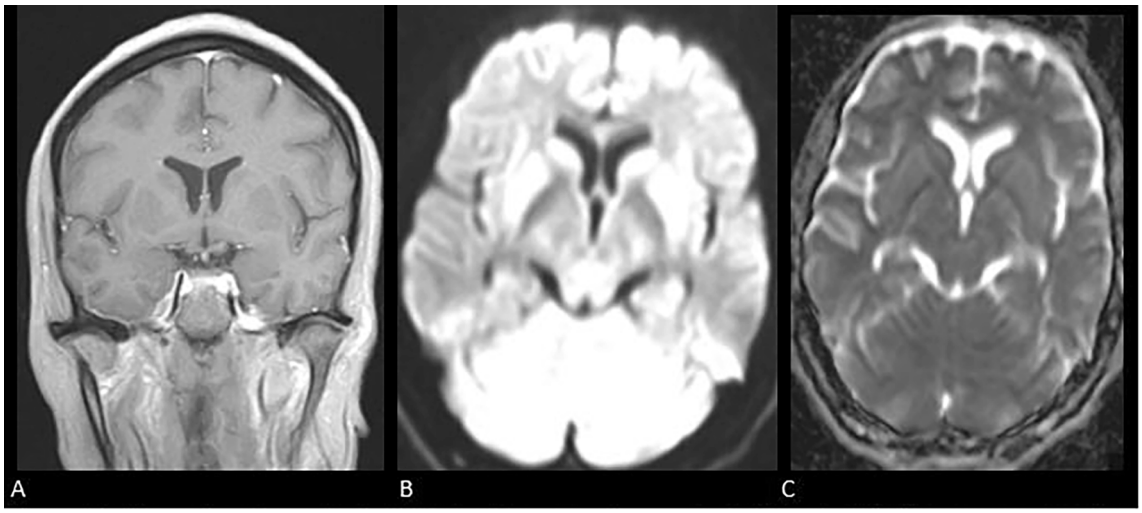

Fig. 2. Coronal post contrast MRI showing no enhancement (A); axial DWI sequence showing hyperintense lesion in bilateral basal ganglia region (B); and axial ADC showing no fluid restriction in Bipallida; region (c).

rather than tremor dominant features. This is in congruent with previously reported cases [3–5]. This is contrary to previous reports from Africa on non-COVID 19 related Parkinson's disease patients; where tremor is often the dominant complain [8,9].Thus, future studies should focus in assessing the reason behind this phenotypical difference. In summary, the present case describes SARS-COV-2 associated akinetic rigid Parkinsonism with evidences of symmetrical pallidal lesions, without prominent respiratory symptoms and history of hypoxic-ischemic insult. The case also highlighted on the amenability of such symptomatology to a short course steroid and dopamine replacement. We believe this case will contribute knowledge to our existing understanding of COVID 19 and movement disorders, especially Parkinsonism.

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Consent to publication

Written informed consent was obtained from the patient.

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.

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Biniyam A. Ayele[a,*], Hanna Demissie[b], Meron Awraris[b], Wondwossen Amogne[c], Ali Shalash[d], Kemal Ali[b], Yared Zenebe[b], Abenet Tafesse[b], Chethan P. Venkatasubba Rao[e]

[a] *Department of Neurology, Addis Ababa University, PoBox 6396, Liberia Street, Addis Ababa, Ethiopia*
[b] *Department of Neurology, Addis Ababa University, Addis Ababa, Ethiopia*
[c] *Department of Internal Medicine, Addis Ababa University, Addis Ababa, Ethiopia*
[d] *Department of Neurology, Ain Shams University, Cairo, Egypt*
[e] *Department of Neurology and Neurosurgery, Vascular Neurology and Neurocritical Care, Baylor College of Medicine, USA*

[*] Corresponding author.
E-mail addresses: biniyam.alemayehu@aau.edu.et (B.A. Ayele), cprao@bcm.edu (C.P. Venkatasubba Rao).