# Neuro-ophthalmic Sequelae in COVID-19 Recovered Cases

Dear Editor,

The novel coronavirus has exhibited its neuro ophthalmic manifestations, not just as mucormycosis but as sequelae of its neurotropic nature. The spike (S) glycoprotein of coronavirus is said to interact with ACE2 receptors of human cells. The entry of the virus in neural tissue is facilitated by cleavage of cell membrane by protein transmembrane serine protease 2.[1] This coronavirus disease (COVID-19) pandemic has revealed a wide spectrum of consequences on various organ systems caused by the virus. Likewise, it has even led to ophthalmic manifestations, involving every layer of eyeball including the neural tissue.[2]

Here we report 37 cases who had COVID-19 infection, clinical or subclinical, and who presented to our neuro-ophthalmology department during 2 months (June and July 2021). Treatment history, history of hospital admission, and systemic history were noted. Cases with concomitant retinal pathologies were excluded. The median age of cases was 45 years. Out of a total of 37 cases, 19 (51.3%) were females and 18 (47.3%) males.

Out of 37, a majority of the patients (14) presented with headache, five with isolated cranial neuropathies, two with multiple cranial nerve palsy, three with transient visual loss, four with papilledema, two with optic neuritis with infective etiology, three with orbital apex syndrome with fungal sinusitis, two with asthenopia, one with papillitis, and one with non-arteritic anterior ischemic neuropathy. There was no positive association of pre- existing systemic illness with the incidence of neuro- ophthalmic manifestations in COVID 19 recovered cases.

SARS-CoV-2 is said to incite immune response. A patient presenting with post-COVID-19 optic neuritis was positive for anti-MOG antibodies, virus being the inciting factor for the T-cell mediated immune response.[3]

COVID-19 has been associated with risk of cerebral venous thrombotic and arterial thrombotic events, thus explaining the possible cause of papilledema, transient visual loss, and non-arteritic anterior ischemic neuropathy.[4,5]

We have even reported a subclinical case of COVID-19 presenting as papilledema and being diagnosed by a neurologist as post-COVID-19-related inflammatory meningitis.

We reported a few more cases after our study duration. These included six cases of cerebrovascular accidents presenting as homonymous hemianopia, three cases of cerebral venous thrombosis presenting as papilledema, two cases of myasthenia gravis, and one multiple sclerosis post-COVID-19 fever.

It is thought that molecule of SARS-CoV-2 mimics acetylcholine receptors that may trigger the immune response, leading to post-infectious myasthenia gravis.[6] There is a temporal association between COVID-19 vaccination and relapse of multiple sclerosis as vaccines activate the immune response and accelerate the transition from subclinical to clinical disease.[7] Similarly, the association of post vaccination non-arteritic anterior ischemic neuropathy as a result of possible vasculopathy caused by inflammatory events is also speculated.[8]

Though cases of COVID-19 have decreased in number, new strains of COVID-19 still continue to evolve. Many neurological diseases with dreadful sequelae present with neuro-ophthalmic symptoms. One should be vigilant while dealing with neuro-ophthalmic cases. Frontline physicians should also recognize the signs and screen for them while treating patients.

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**Conflicts of interest**

There are no conflicts of interest.

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