

# COVID-19 and Guillain-Barre Syndrome - a Case report

**Amira Sidig** (✉ [Amirasiddig121@hotmail.com](mailto:Amirasiddig121@hotmail.com))

of community medicine at Nelain University faculty of medicine, Sudan, Khartoum City

**Khabab Abbasher**

University of Khartoum Faculty of medicine Sudan, Khartoum City

**Mutaz F. Digna**

The University of Khartoum, Faculty of Medicine, Khartoum-Sudan

**Mohamed Elsayed**

Department of Psychiatry and Psychotherapy III, Leimgrubenweg 12-14, 89075 Ulm, Germany

**Hussien Abbasher**

MBBS student at AlYarmouk college Sudan, Khartoum City

**Mohammed Abbasher**

Neilain University faculty of medicine Sudan, Khartoum

**Abbasher Hussien**

University of Khartoum Faculty of medicine Sudan, Khartoum City

---

## Case Report

**Keywords:** COVID-19 and Guillain-Barre syndrome, COVID-19 case report, COVID-19 and Neurology, COVID-19 neurological manifestations

**DOI:** <https://doi.org/10.21203/rs.3.rs-48327/v1>

**License:**  This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

---

# Abstract

Coronaviruses are a family of related viruses that cause diseases in mammals and avians. Guillain-Barre syndrome is a rare disorder in which the body's immune system attacks peripheral nerves.

The case:

A 65 years old Sudanese male with no diabetes mellitus or hypertension present to the clinic; On examination, he has upper and lower limb weakness (quadriplegia). The condition was preceded by upper respiratory tract infection. Chest X-ray showed features of pneumonia Chest CT scan showed multiple bilateral ground-glass opacities and consolidation typical of COVID-19 pneumonia. Brain MRI was normal. The COVID-19 nasal swab test was positive. Nerve conduction study showed evidence of polyradiculopathies with dominant demyelination supporting the diagnosis of Guillain-Barre syndrome. The patients died after seven days; because of progressive respiratory failure.

# Introduction

Coronaviruses are a family of related viruses that cause diseases in mammals and birds.

Human to human transmission of coronaviruses is primarily thought to occur among close contacts via respiratory droplets generated by sneezing and coughing. (1)

Pneumonia of unknown cause detected in Wuhan, China, was first reported to the World Health Organization WHO Country Office in China on 31 December 2019. Later the WHO named a disease caused by the newly incriminated in global public health hazard as COVID-19. COVID-19 is caused by Severe acute respiratory virus syndrome coronavirus 2 (SARS-2). "Most people infected with the SARS-2 virus will experience mild to moderate respiratory illness and recover without requiring special treatment. Older people and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop severe illness".

People may be sick with the virus for 1 to 14 days before developing symptoms. The most common symptoms of coronavirus disease (COVID-19) are cough, shortness of breath or difficulty breathing, fever, chills, muscle pain, sore throat, and new loss of taste or smell. Most people (about 80%) recover from the disease without needing special treatment. The disease can be severe and even fatal. (3-4)

Covid-19 can cause severe respiratory problems such as respiratory failure, acute respiratory distress syndrome. (5). As was reported by Brit long and his colleagues' coronavirus can cause several cardiovascular complications like myocardial injury and myocarditis, acute myocardial infarction, acute heart failure and cardiomyopathy, dysrhythmias, and venous thromboembolic events. (6)

Some people suffering from severe cases of COVID-19 are showing signs of kidney damage. (7) Coronaviruses are not always confined to the respiratory tract, and under certain conditions, they can invade the central nervous system and cause neurological pathologies. Neurological symptoms have been reported in patients affected by COVID-19, such as headache, dizziness, myalgia, and anosmia, and cases of encephalopathy, encephalitis, necrotizing hemorrhagic encephalopathy, stroke, epileptic seizures. (8-9)

Guillain-Barre syndrome :

It is a rare disorder in which the body's immune system attacks peripheral cranial nerves. Weakness and tingling of the extremities are usually the first symptoms. These sensations can quickly spread, eventually paralyzing the whole body. The exact cause of Guillain-Barre syndrome is not known. The disorder usually appears days or weeks after a respiratory or digestive tract infection. Guillain-Barre syndrome may be triggered by:

1/Most commonly, infection with campylobacter.

2/Influenza virus

3/Cytomegalovirus

4/Epstein-Barr virus

5/Zika virus

6/Hepatitis A, B, C and E

7/HIV, the virus that causes AIDS

8/Mycoplasma pneumonia

9/Surgery

10/Trauma

11/Hodgkin's lymphoma

12/And rarely, influenza vaccinations or childhood vaccinations.

Guillain-Barre syndrome's weakness usually starts in the distal parts of both lower limbs and spread to involve the proximal parts, trunk, and both upper limbs. Cranial nerves may be involved, mainly bilateral facial pulses. Sensation usually is intact, although some patients may have stocks and gloves sensory disturbance. 3-5% may have urine retention. There are two serious complications associated with Guillain-Barre syndrome :

1- respiratory muscle paralysis.

2-Autonomic nervous system involvement.

On clinical examination of patients with Guillain-Barre syndrome in addition to the weakness, hypotonia and areflexia are the dominant findings.

**Diagnosis:**

Guillain-Barre syndrome can be challenging to diagnose in its earliest stages. Its signs and symptoms are similar to those of other neurological disorders and may vary from person to person. Investigations like lumbar puncture, electromyography, and nerve conduction studies can help in diagnosis.

**Treatment:**

There is no cure for Guillain-Barre syndrome. However, two types of treatments can speed recovery and reduce the severity of the illness:

1/Plasma exchange (plasmapheresis).2I-iv immunoglobulin (10)

## Case Presentation

**History:**

A 65 years old Sudanese male patient presented to our clinic. He was not known to have diabetes mellitus or hypertension. On examination, he had upper and lower limb weakness (quadriplegia). The condition was preceded by upper respiratory tract infection in low-grade fever, sore throat, dry irritant cough, headache, and generalized fatigue. After five days, he started to complain of numbness and weakness involving both upper and lower limbs. It started distally, and after three days, the proximal parts of both lower limbs were involved. Three days later, both upper limbs were affected. Also, facial paraesthesia with the inability to close his mouth, and his both eyes were noticed. Also, he reported that he has clumsiness of both upper limbs. Those symptoms were followed by urinary incontinence. Then he became completely paralyzed. He has no chest pain, palpitations, or dyspnea. The condition was not associated with convulsions or loss of consciousness. During the disease course, he developed breathlessness, and we thought of respiratory muscles involvement and autonomic nervous system involvement. When he was investigated by(CT chest), it raised the suspicion of COVID-19 infection, and when he was investigated for COVID-19, the results were positive. Then he was transferred to the ICU, where he received both IV immunoglobulin and connected to a mechanical ventilator.

**Examination :**

On examination, the patient looked ill and pale, but not jaundiced or cyanosed. The patient had no chest pain, palpitations, or dyspnea. The pulse was 78/minute, regular with good volume, and the blood pressure was 110/70 mmHg. The examination of the cardiovascular system, chest, and abdomen was

normal. The abnormalities were confined to the central nervous system. The patient was fully conscious and oriented in time, person, and place., both his recent and remote memory were intact. Although he was a little bit alert, he was co-operative.

Cranial nerves examination revealed evidence of olfactory nerve involvement and bilateral papilledema. There were bilateral facial nerve involvement and slight palatal muscle weakness without neck weakness. The patient had a truncal weakness. Both upper and lower limb examinations showed no wasting or deformity. There were generalized hypotonia and areflexia. Power was grade three in all groups of muscles. All modalities of sensation were intact, including light touch, pinprick, and vibration. Coordination cannot be demonstrated due to weakness. Lists of investigations were made including urine analysis, stool analysis, blood urea, electrolyte and liver function test were normal. ECG and echocardiography were normal. Chest X-ray showed features of pneumonia; chest CT Scan showed multiple bilateral ground-glass opacities and consolidation typical of COVID-19 pneumonia. Brain MRI was normal, and the COVID-19 nasal swab test was positive. Nerve conduction study showed evidence of polyradiculopathies with dominant demyelination supporting the diagnosis of Guillain-Barre syndrome.

The patients died after seven days; because of progressive respiratory failure.

## Discussion

The full detailed history and proper clinical examination and the nerve conduction study findings are in favor of acute polyradiculoneuritis with prominent demyelinating features, so a diagnosis of acute Guillain-Barre syndrome associated with COVID-19 was made. Guillain-Barre syndrome is an acute/subacute immune-mediated polyradiculoneuropathy characterized by varying degrees of limb weakness and sometimes cranial nerve involvement. There are hypotonia and areflexia in the affected limbs in addition to the weakness. Also, it can present with sensory disturbances in the form of stocks and gloves impairment of sensation. In a few numbers of patients, there may be urinary incontinence, respiratory muscles paralysis, and autonomic nervous system involvement.

Coronavirus infection may be asymptomatic. The most common symptoms at the onset of the disease are generalized fatigue, headache, low-grade fever, and sore throat. (11-12-13) Also, it can present with GIT symptoms (diarrhea). (14) Systemic complications of COVID-19 infection are acute cardiac damage, renal failure, recurrent pulmonary embolism, and acute respiratory distress syndrome. (15-16) Almost 35% of patients with COVID-19 infection present with neurological manifestations like headache, loss of taste and smell, myopathy, epilepsy, stroke(hemorrhagic or infarction), and encephalitis. (17-18) Coronavirus may cause neurological disorders through its direct effect on the brain or by activating the immune system. (19)

The mechanism by which COVID-19 causes Guillain-Barre syndrome was not yet investigated. However, it was known that coronavirus stimulates inflammatory cells and produces inflammatory cytokines. This creates an immune-mediated process, but it was not known whether Covid-19 induces the production of

antibodies against specific gangliosides like what tends to occur with certain forms of Guillain-Barre syndromes. (20-21)

This report's limitations are the lack of screening of autoimmune disease, paraneoplastic syndrome, vasculitis relating antibodies, and antigangliosides testing.

### **Recommendations:**

1- We recommend that during COVID-19 infection treatment, close monitoring of the neurological complications of the disease is needed.

2- The relationship between Covid-19 infection and Guillain-Barre syndrome needs to be confirmed in large case series; early recognition and treatment of the neuromuscular and autonomic worsening lead to cardiorespiratory failure in patients with Guillain-Barre syndrome and mild pulmonary COVID-19 can be achieved.

## **Declarations**

**Ethical approval was taken from Sudan national health research ethics committee. Verbal and written consent was taken from the patient.**

### **Competing Interests:**

**The authors declare no competing interests.**

## **References**

(1) Coronavirus. Wikipedia. <https://en.m.wikipedia.org/wiki/Coronavirus>

(2) World Health Organization (2020). <https://www.who.int/emergencies/diseases/novel-coronavirus2019/events-as-they-happen>

(3) Coronavirus Disease (COVID19) (2019) People who are at Higher Risk for severe illness. Centers for Disease Control and Prevention. <https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/people-at-higher-risk.html>?

(4) COVID-19 and gastrointestinal symptoms. <https://www.webmd.com/lung/covid19-digestive-symptoms>

(5) Complications coronavirus can cause. <https://www.webmd.com/lung/coronavirus-complications>

(6) Long, B., Brady, W., Koyfman, A. and Gottlieb M. (2020) Cardiovascular complications in COVID-19. The American Journal of Emergency Medicine, DOI: 10.1016/j.ajem.2020.04.048

- (7) Coronavirus: Kidney damage caused by COVID-19 Johns Hopkins Medicine.  
<https://www.hopkinsmedicine.org/health/conditions-and-diseases/coronavirus/coronavirus-kidney-damage-caused-by-covid19>
- (8) Carod-Artal FJ. Neurological complications of coronavirus and COVID-19. *Rev Neurol* 70 :311-322  
DOI:10.33588/rn.7009.2020179
- (9) Mao, L., Jin, H., Wang, M., Hu, Y., Chen, et al (2020) Neurologic Manifestations of Hospitalized Patients With Coronavirus Disease 2019 in Wuhan, China. *JAMA Neural* e201127
- (10) Guillain-Barre syndrome Mayo clinic. <https://www.mayoclinic.org/diseases-conditions/guillain-barre-syndrome/diagnosis-treatment/drc-20363006>
- (11) Casadevall A, Pirofski LA (2020) The convalescent sera option for containing COVID-19. *J Clin Invest* 130:1545–1548.
- (12) Wang D, Hu B, Hu C, Zhu F, Liu X, et al. (2020) Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in Wuhan, China. *JAMA* 323:1061–1069.
- (13) Li YC, Bai WZ, Hashikawa T. (2020) The neuroinvasive potential of SARS-CoV2 may play a role in the respiratory failure of COVID-19 patients. *J Med Virol* 92:552–555.
- (14) Krauer F, Riesen M, Reveiz L, Oladapo TO, Martinez-Vega R et al. (2017) Zika virus infection as a cause of congenital brain abnormalities and Guillain-barré syndrome: a systematic review. *PLoS Med* 14:e1002203.
- (15) McGonagle D, Sharif K, O'Regan A, Bridgewood C, et al. (2020). The role of Cytokines including Interleukin-6 use in COVID-19 induced pneumonia and macrophage activation syndrome-Like Disease. *Autoimmun Rev*:102537.
- (16) Qin C, Zhou L, Hu Z, Zhang S, Yang S, et al. (2020) Dysregulation of immune response in patients with COVID-19 in Wuhan, China. *Clin Infect Dis Epub* claa248
- (17) Mao L, Wang M, Chen S, He Q, Chang J, et al. (2020) Neurological manifestations of hospitalized patients with COVID-19 in Wuhan, China: a retrospective case series study. *medRxiv*
- (18) Sejvar J.J., Baughman A.L., Wise M., Morgan OW (2011) Population Incidence of Guillain-Barré syndrome: a systematic review and Meta-Analysis. *Neuroepidemiology* 36:123–133.
- (19) Jacobs B.C., Rothbarth P.H., van der Meché FG, Herbrink P, Schmitz PI, et al. (1998) The spectrum of antecedent infections in Guillain-Barré syndrome: A case-control study. *Neurology*. 51: 1110–1115.  
[PubMed] [Google Scholar]

(20) Sahin AR, Erdogan A, Mutlu Agaoglu P, Dincir Y, Cakirci AY, et al. 2019 Novel Coronavirus (COVID-  
Outbreak: A Review of the Current Literature. EJMO 2020;4(1):1-7.14.

(21) Kim J.E., Heo J.H., Ho Kim, Song S.H., Park S.S., Park T.H. Neurological complications during  
treatment of Middle East respiratory syndrome. J Clin Neurol. 2017;13(3):227–233