



# Hallucination in Relation to Coronavirus Disease: A Case Report

Behzad Bijani<sup>1</sup> , Faezeh Zahedian<sup>2\*</sup> , Somayeh Ghorani<sup>2</sup> 

<sup>1</sup> Medical Microbiology Research Center, Qazvin University of Medical Sciences, Qazvin, Iran

<sup>2</sup> Clinical Research Developmental Unit, 22 Bahman Hospital, Qazvin University of Medical Sciences, Qazvin, Iran

## \*Corresponding author:

Faezeh Zahedian, MD-Psychiatrist,  
Assistant Professor, Psychiatry  
Department, Faculty of Medicine,  
Qazvin University of Medical  
Sciences, Qazvin, Iran.  
Tel: +989127810264  
Email: fzahedian@qums.ac.ir

Received: 19 Oct 2021  
Accepted: 10 Feb 2023  
ePublished: 19 Mar 2023



## Background

The outbreak of Coronavirus disease (COVID-19) was first identified in Wuhan, China, in December 2019, but it soon spread all around the globe [1-5].

COVID-19 respiratory manifestations range from mild signs to respiratory failure. Nevertheless, this infection is not limited to the respiratory system and can affect other organs, including the gastrointestinal, cardiovascular, and central nervous systems [6-9].

There is growing evidence regarding the neuroinvasive consequences of COVID-19. Angiotensin-converting enzyme 2 receptors are expressed over glial cells and neurons. Therefore, the central nervous system (CNS) is a susceptible target for COVID-19, and the development of different psychiatric and neurological representations is predictable. However, few reports have described psychotic representations of COVID-19 [10-12].

In this study, we reported a case of COVID-19

## Abstract

**Background and Objective:** Coronavirus disease (COVID-19) respiratory manifestations range from mild signs to respiratory failure. Nevertheless, Coronavirus is not limited to the respiratory system and affects other organs, including the central nervous system. In this study, we reported a case of COVID-19 associated with the first episode of psychotic symptoms.

**Case Presentation:** The patient was a 39-year man who was brought to the emergency ward with loss of consciousness, following opioid overdose. He was intubated for airway protection. After the naloxone infusion, he became alert. The brain CT scan was normal, but the findings of the chest CT scan were compatible with COVID-19 involvement. In addition, his throat swab sample was positive. *On the second day, he stated that he heard strange voices talking to each other, but he could not figure out where those voices were coming from. He did not experience hallucinations in any other sensory modalities. On the third day, three episodes of generalized tonic clonic seizures suddenly emerged. The brain CT scan demonstrated bilateral parieto-occipital hypoattenuation, which extended to the frontal lobes. Cortical hemorrhage was also seen in the right parietal lobe.*

**Implications for Practice:** The evidence indicates the neuroinvasive potential of COVID-19. Therefore, psychiatric symptoms are a novel phenomenon related to this disease. Clinicians should consider psychiatric representations in COVID-19 patients in order to decrease the complication of this disease.

**Keywords:** Auditory hallucination, COVID-19, Psychotic symptoms

associated with the first episode of psychotic symptoms.

## Case Presentation

The current study was approved by the Ethics Committee of Qazvin University of Medical Sciences (Ethics Committee No. IR.QUMS.REC.1399.246).

Our case was a 39-year-old man referred to the emergency ward of Bu Ali Hospital, Qazvin, Iran, with loss of consciousness, following opioid overdose. In the initial examination, the patient was cyanotic. He also had a Glasgow Coma Scale score of 6. The body temperature was 37°C, the blood pressure was 100/70 mmHg, and the respiratory rate was 8 breaths per min. He had shallow breathing, and the oxygen saturation was 80%.

He was intubated for airway protection. After the naloxone infusion, the patient became alert and oriented with a normal respiratory rate.

Laboratory tests showed a high white blood cell

count of 19700/uL with 5% lymphocyte and platelets count of 150000/uL. C-reactive protein level and erythrocyte sedimentation rate were within normal limits. The brain CT scan was normal, but the findings of the chest CT scan indicated COVID-19.

He was hospitalized at the infectious disease unit. Oral hydroxychloroquine sulfate was prescribed on 200 mg twice a day, and intravenous ceftriaxone was prescribed on 1 gr twice a day. A throat swab sample was also taken, which was positive for COVID-19.

On the second day, the patient stated that he heard strange voices talking to each other, but he could not figure out where they were coming from. He did not experience hallucinations in any other sensory modalities. Those sounds led to sleep disturbance and decreased during watching TV. The patient had no delusional thoughts, and he just looked worried and nervous. He was cooperative in the interview process and had no previous history of psychiatric disorders. He has been addicted to *opioid since he was 18*, but he did not use any other substances.

On the third day, three episodes of generalized tonic clonic seizures suddenly emerged, and his blood pressure increased (180/120 mmHg). The neurological examination showed confusion, disorientation, and left hemiparesis. The patient was transferred to the ICU, and labetalol was administered at the rate of 1 mg/min. Phenytoin and sodium valproate were also prescribed to control seizures.

The brain CT scan demonstrated bilateral parieto-occipital hypoattenuation, which extended to the frontal lobes. Cortical hemorrhage was also seen in the right parietal lobe. The brain MRI findings were consistent with the posterior reversible leukoencephalopathy syndrome and right parietal lobe hemorrhage. However, the brain MR venography was unremarkable.

He was under care in the ICU, and after five days, he became awake and oriented. He was then hospitalized at the infectious disease unit, and his auditory hallucination lasted for two weeks.

After two weeks, the auditory hallucination decreased gradually without any medication, and after 25 days, when he was discharged, his hallucination discontinued and seizures had been controlled. Nevertheless, the left-side hemiparesis still continued during this study period.

## Discussion

In this study, we reported a case of COVID-19 with psychotic symptoms. Limited reports have shown psychotic symptoms in those suffering from

COVID-19. Ferrando et al. described the first episode of psychotic symptoms in three cases that were positive for COVID-19 and had no clinical somatic symptoms [11]. Parra et al. identified 10 COVID-19 patients with psychotic representations who had no previous history of psychosis. In this study, structured delusions mixed with confusional states were the most frequent psychiatric manifestations in COVID-19 patients [13].

The etiology of psychotic symptoms in COVID-19 patients is poorly understood, but several possible mechanisms have been considered [9-16].

One of these hypotheses involves CNS invasion as Coronavirus is capable of penetrating the brain through different mechanisms, such as the olfactory pathway and peripheral nerves. According to neuroinvasive qualities, Coronaviruses can be opportunistic agents in the CNS [16]. Severe inflammatory responses to COVID-19 (cytokine storm) may cause psychiatric symptoms. Moreover, the influence of immunological factors on the pathogenesis of psychiatric diseases, such as depression, schizophrenia, and neuropsychiatric representations of HIV, have been identified in several studies [11, 17].

Iatrogenic factors should also be taken into consideration. High-dose corticosteroids can cause psychotic representations. Therefore, treatment with corticosteroids in COVID-19 patients should be considered a probable risk factor [10, 11, 15].

The term "Corona phobia" indicates an irrational and unusual fear related to COVID-19 that leads to excessive concern, significant stress about occupational loss, enhanced safety-seeking behaviors, and marked impairment in daily life functioning. This fear can trigger the development of psychotic symptoms in patients with previous mental illnesses [12, 18].

## Implications for Practice

In this study, we reported a case of COVID-19 associated with the first episode of psychotic symptoms. Further studies are needed to investigate the association between COVID-19 and psychosis, and clinicians should consider psychiatric representations in COVID-19 patients in order to decrease the complication of this disease.

## Compliance with ethical guidelines

All ethical principles were considered in conducting the present study.

## Acknowledgments

The authors would like to express their sincere gratitude to the participants for their cooperation in conducting the present study.

## Authors' contributions

All authors participated in drafting of the article and approved

the final version.

#### Funding/Support

None.

#### Conflicts of Interest

The authors declare that they have no conflicts of interest.

#### References

- Pang J, Wang MX, Ang IY, Tan SH, Lewis RF, Chen JI, et al. Potential rapid diagnostics, vaccine and therapeutics for 2019 novel coronavirus (2019-nCoV): a systematic review. *Journal Of Clinical Medicine*. 2020; 9(3):623. [DOI:10.3390/jcm9030623] [PMID] [PMCID]
- Lu R, Zhao X, Li J, Niu P, Yang B, Wu H, et al. Genomic characterisation and epidemiology of 2019 novel coronavirus: implications for virus origins and receptor binding. *The Lancet*. 2020; 395(10224):565-74. [DOI:10.1016/S0140-6736(20)30251-8] [PMID] [PMCID]
- Mozhdehipanah H, Paybast S, Bahadori R. Posterior reversible encephalopathy syndrome as a rare presentation of Coronavirus Disease 2019: A Case Report and Literature Review. *Journal of Vessels and Circulation*. 2020; 1(2):11-6. [DOI:10.29252/jvesselcirc.1.2.11]
- Uptegrove R, Khandaker GM. Cytokines, oxidative stress and cellular markers of inflammation in schizophrenia. *Current Topics in Behavioral Neurosciences*. 2020; 44:49-66. [DOI:10.1007/7854\_2018\_88] [PMID]
- Sorbello M, El-Boghdady K, Di Giacinto I, Cataldo R, Esposito C, Falcetta S, et al. The Italian coronavirus disease 2019 outbreak: recommendations from clinical practice. *Anaesthesia*. 2020; 75(6):724-32. [DOI:10.1111/anae.15049] [PMID]
- Sahin AR, Erdogan A, Agaoglu PM, Dineri Y, Cakirci AY, Senel ME, et al. 2019 novel coronavirus (COVID-19) outbreak: a review of the current literature. *Eurasian Journal of Medicine and Oncology* . 2020; 4(1):1-7. [DOI:10.14744/ejmo.2020.12220]
- Kolifarhood G, Aghaali M, Saadati HM, Taherpour N, Rahimi S, Izadi N, et al. Epidemiological and clinical aspects of COVID-19; a narrative review. *Archives of Academic Emergency Medicine*. 2020; 8(1):e41. [PMID] [PMCID]
- Gao QY, Chen YX, Fang JY. 2019 Novel coronavirus infection and gastrointestinal tract. *Journal of Digestive Diseases*. 2020; 21(3):125. [DOI:10.1111/1751-2980.12851] [PMID] [PMCID]
- Mao L, Wang M, Chen S, He Q, Chang J, Hong C, et al. Neurological manifestations of hospitalized patients with COVID-19 in Wuhan, China: a retrospective case series study. *JAMA Neurology*. [DOI:10.1001/jamaneurol.2020.1127] [PMID] [PMCID]
- Robinson CP, Busl KM. Neurologic manifestations of severe respiratory viral contagions. *Critical Care Explorations*. 2020;2(4):e0107. [DOI:10.1097/CCE.000000000000107] [PMID] [PMCID]
- Ferrando SJ, Klepacz L, Lynch S, Tavakkoli M, Dornbush R, Baharani R, et al. COVID-19 psychosis: a potential new neuropsychiatric condition triggered by novel coronavirus infection and the inflammatory response?. *Psychosomatics*. 2020; 61(5):551-5. [DOI:10.1016/j.psych.2020.05.012] [PMID] [PMCID]
- Tariku M, Hajure M. Available evidence and ongoing hypothesis on corona virus (COVID-19) and psychosis: is corona virus and psychosis related? A narrative review. *Psychology Research and Behavior Management*. 2020; 13:701-4. [DOI:10.2147/PRBM.S264235] [PMID] [PMCID]
- Parra A, Juanes A, Losada CP, Álvarez-Sesmero S, Santana VD, Martí I, et al. Psychotic symptoms in COVID-19 patients. A retrospective descriptive study. *Psychiatry Research*. 2020; 291:113254. [DOI:10.1016/j.psychres.2020.113254] [PMID] [PMCID]
- Cheng SK, Tsang JS, Ku KH, Wong CW, Ng YK. Psychiatric complications in patients with severe acute respiratory syndrome (SARS) during the acute treatment phase: a series of 10 cases. *The British Journal of Psychiatry*. 2004; 184(4):359-60. [DOI:10.1192/bjp.184.4.359] [PMID]
- Sheng B, Cheng SK, Lau KK, Li HL, Chan EL. The effects of disease severity, use of corticosteroids and social factors on neuropsychiatric complaints in severe acute respiratory syndrome (SARS) patients at acute and convalescent phases. *European Psychiatry*. 2005; 20(3):236-42. [DOI:10.1016/j.eurpsy.2004.06.023] [PMID] [PMCID]
- Desforges M, Le Coupancec A, Dubeau P, Bourgoin A, Lajoie L, Dubé M, et al. Human coronaviruses and other respiratory viruses: underestimated opportunistic pathogens of the central nervous system? *Viruses*. 2020; 12(1):14. [DOI:10.3390/v12010014] [PMID] [PMCID]
- Mehta P, McAuley DF, Brown M, Sanchez E, Tattersall RS, Manson JJ. COVID-19: consider cytokine storm syndromes and immunosuppression. *The Lancet*. 2020; 395(10229):1033-4. [DOI:10.1016/S0140-6736(20)30628-0] [PMID] [PMCID]
- Arora A, Jha AK, Alat P, Das SS. Understanding coronaphobia. *Asian Journal of Psychiatry*. 2020; 54:102384. [DOI:10.1016/j.ajp.2020.102384] [PMID] [PMCID]