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DEVELOPMENT OF ENCEPHALITIS IN COVID DISEASE

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Abstract
In this article, the development of encephalitis in covid disease, prevention of the development of encephalitis, factors causing encephalitis in COVID-19 infection and its treatment are highlighted.

Keywords: Covid disease, encephalitis, direct viral, signs of encephalitis, symptoms.

Introduction

Coronaviruses – a group of viruses that cause diseases in mammals and birds. In humans, the viruses lead to respiratory infections, which are usually mild, including common colds; however, rarer forms like SARS, MERS, and the new coronavirus can lead to death. In cattle and pigs, they may cause diarrhea, while in chickens, they can lead to upper respiratory diseases. Currently, there are no approved vaccines or antiviral treatments for prevention or treatment. According to a new study conducted by Israeli medical professionals, the symptoms caused by the coronavirus disappear entirely after approximately six months. The study also found that 95% of individuals who recovered from COVID-19 did not develop irreversible consequences such as respiratory or heart diseases. Uzbek specialists have stated that even those who have recovered from COVID-19 should receive the vaccine. Due to the virus's variability, constant mutation, high risks associated with COVID-19, and the possibility of reinfection, they recommend vaccination regardless of whether someone has previously been infected with the virus. Spanish scientists also conducted research. Within the framework of this study, they examined cases of loss of taste and smell, which are among the most common symptoms of COVID-19. They concluded that the loss of smell in COVID-19 patients may indicate a strong immune response.

COVID-19 has infected millions of people worldwide and led to serious complications affecting not only the respiratory system (pneumonia) but also other systems of the body. This disease has several acute and long-term complications, among which encephalitis (inflammation of the brain) is particularly noteworthy. Although the neurological complications of COVID-19, including encephalitis, were less studied in the earlier stages of the pandemic, recent studies show that this condition is relatively common. This article discusses the connection between COVID-19 and encephalitis, the development of this condition, and measures for its prevention. COVID-19 is a respiratory disease caused by the SARS-CoV-2 virus. Although the primary symptom of the disease is a respiratory symptom, the virus’s impact on the body extends beyond just acute respiratory illness. Some patients infected with COVID-19 develop neurological complications affecting the brain and central nervous system (CNS). Encephalitis (inflammation of the brain) is

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one such complication and typically results from an exaggerated immune response or the direct replication of the virus in the brain. Encephalitis develops in approximately 1-3% of patients infected with COVID-19, although this percentage may have increased with the discovery of new strains of the virus. Encephalitis can develop as a result of viral or autoimmune inflammation, and its symptoms can include headaches, dizziness, sensory impairment, speech difficulties, memory and attention loss, coma, or seizures.

Factors Contributing to the Development of Encephalitis in COVID-19 Infection

The connection between COVID-19 and encephalitis can occur through several mechanisms:

1. **Direct Viral Effect:** The SARS-CoV-2 virus can directly enter the neurons of the brain and damage them. The main mechanism that allows the virus to enter the brain tissue is through endothelial cells, leading to the virus affecting the central nervous system.
2. **Immune Response:** COVID-19 infection, especially in severe forms, triggers a strong immune response. The production of immune cells and antibodies can result in a condition called a cytokine storm, where the body's immune system starts attacking itself, leading to inflammation in the brain (encephalitis).
3. **Vascular Effects:** COVID-19 affects not only the lungs but also blood vessels. The virus may weaken the walls of blood vessels, leading to blood leakage into the brain or inflammation of the blood vessels, which can result in encephalitis.
4. **Post-COVID Syndrome (Long COVID):** Some patients experience long-term symptoms for weeks or months after recovering from COVID-19, known as Long COVID. These include neurological symptoms like headaches, dizziness, memory loss, and reduced attention. These symptoms can sometimes indicate the presence of encephalitis.

Symptoms and Diagnosis of Encephalitis

Patients with COVID-19, particularly those in severe condition or those recovering for a long time, may experience the following neurological symptoms:

- Headaches and dizziness
- Difficulty speaking, remembering, or thinking
- Sensory impairment
- Seizures or muscle weakness
- Psychological changes (e.g., depression or anxiety)

To diagnose encephalitis, clinical evaluation is required, along with the patient's medical history and primarily imaging techniques like MRI (magnetic resonance imaging) or CT (computed tomography), as well as tests on blood and cerebrospinal fluid (CSF) for analysis.

Treatment of Encephalitis in COVID-19 Infection

The key factor in treating encephalitis is prompt medical attention. Treatment options may include:

• **Antiviral medications:** If encephalitis is caused by a direct viral infection, antiviral medications (e.g., remdesivir) may be used.

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• **Immunosuppressive therapy:** If encephalitis is due to autoimmune reactions, immunosuppressive drugs (e.g., steroids) may be administered.

• **Supportive treatments:** Symptomatic treatments, such as pain management, respiratory support, or managing seizures, may also be applied.

Preventing the Development of Encephalitis

To prevent encephalitis, it is essential to first prevent the COVID-19 infection:

- **Vaccination:** Receiving the COVID-19 vaccine reduces the risk of severe forms of the disease, including encephalitis.
- **Hygiene measures:** Regular handwashing, wearing masks, maintaining social distancing, and ensuring proper ventilation in enclosed spaces are necessary.
- **Early treatment:** Promptly seeking medical attention at the first signs of COVID-19 reduces the risk of severe progression.

Although encephalitis is relatively rare among the neurological complications of COVID-19, it is a serious condition that can result in long-term disability or death. Early diagnosis and effective treatment are crucial in managing encephalitis associated with COVID-19.

In conclusion, COVID-19 can lead to several severe complications, one of which is encephalitis. This condition, which may develop as a result of the virus's direct effect on the brain or an exaggerated immune response, can cause long-term complications for some patients. Prevention and treatment of the disease are essential, including vaccination, timely treatment, and proper rehabilitation. Early detection and medical intervention are key to preventing severe complications, including encephalitis, related to COVID-19. To prevent encephalitis in COVID-19, it is vital to avoid infection through vaccination, adherence to hygiene guidelines, and supporting the immune system. If neurological symptoms or COVID-19-related signs appear, immediate consultation with a healthcare provider is necessary. Early treatment and monitoring play a critical role in preventing severe complications, including encephalitis.

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