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Review Article

Focus on Mental Health during the Coronavirus (COVID-19) Pandemic: Applying Neuropsychological Knowledge from Previous Outbreaks

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Abstract

In December 2019, SARS-CoV-2 was identified for the very first time in humans in the city of Wuhan in China. The initial local outbreak of the new severe acute respiratory syndrome suddenly and rapidly turned into a global pandemic (i.e. COVID-19), as indicated by the World Health Organization, with approximately 503.000 confirmed cases and 22,300 deaths worldwide as of March 2020. Due to this new coronavirus, many countries have sought to control the disease prevalence by activating emergency plans and developing guidelines, focusing on public health through several protective strategies and interventions such as social distancing, school closures, travel restrictions, home confinement and quarantine. Thus, much attention has been focused on the new pandemic and its consequences which, in fact, are certainly not limited to its medical aspects. Although there is ongoing research on the effects of the coronavirus on mental health, research on its associated neurological and neuropsychological symptoms are still limited, despite the fact that such symptoms are apparent. In fact, the neuropsychological consequences of COVID-19 are still unknown and will probably remain unidentified for a long time, as it is more important to understand the course of the virus itself and its medical and physical effects. In this mini review article, we sought to investigate the neuropsychological symptoms of COVID-19 patients and survivors in order to inform policies for the development of subsequent treatment strategies targeting such relevant symptoms.

Keywords: *Coronavirus, neuropsychological effects, neurological symptoms, mental status*

Introduction

Since the initial appearance of the new infectious coronavirus in humans in December 2019 in the city of Wuhan in China, there have been changes to its name from 2019-nCoV and "Severe Acute Respiratory Syndrome – Coronavirus 2" (SARS-CoV-2) to the final name COVID-19. With the current consequences of the pandemic, scientists around the world are struggling to investigate its pathogenesis and its effects on physical health, and to develop effective treatment strategies as soon as possible [1,2,3].

The aim of the study was to focus on the neurological symptoms, in order to investigate possible neuropsychological evidence for long-term consequences of COVID-19.

Results and Discussion

COVID-19 Symptoms

The symptoms of COVID-19 are associated with a consequent acute respiratory syndrome including fever, dry cough, headache, fatigue, and myalgia [4,5]. In more severe cases, pneumonia, dyspnea, acute heart problems, and multiple organ failure have been reported [5].

In addition to the respiratory and other systemic manifestations of the disease, some patients report headaches, nausea, vomiting, ageusia and anosmia [6]. In general, the coronavirus family, with its characteristic crown shape, encompasses SARS-CoV-2 and manifestations such as Multiple Sclerosis (MS) and Encephalomyelitis are also attributed to it, proving its neuroinvasive and neurotropic properties [7]. Therefore, epileptic seizures, convulsions, and changes in mental state are among the symptoms. Coronavirus can spread from the respiratory tract to the Central Nervous System (CNS) through the olfactory bulb causing inflammation and demyelination.

COVID-19; Neurological Manifestations

There is evidence to support that the severity of the disease has been associated with the presence of neurological symptoms, while autopsies have shown brain tissue swelling and partial neurodegeneration in patients [8]. Yin et al. (2020), presented the case of a patient who showed typical symptoms of the disease (i.e., mild cough, fever) at the onset, followed by neurological events such as changes in consciousness between lethargy and irritability, incorrect response to questions and contextually dissociated speech, despite the typical computed tomography of the brain. The patient received medication and 15 days later the previous neurological and neuropsychological manifestations initially observed were not apparent [6].

In addition, Mao et al. (2020) studied 214 hospitalized patients who had presented acute respiratory syndrome as a result of SARS-CoV-2 infection. They categorized patients' subsequent neurological manifestations into three groups: The first group of symptoms were associated with the functioning of the CNS (i.e., confusion, headache, impaired consciousness, ataxia, ischemic stroke, cerebral hemorrhage, epilepsy). The second group of symptoms involved the Peripheral Nervous System (PNS) (i.e., ageusia, anosmia, ypopsia and neuralgia) while the third group focused on musculoskeletal symptoms. Results indicated that 36.4% of the patients became severely ill with COVID-19. The severity of the disease was associated with the manifestation of neurological symptoms, mainly the presence of cerebrovascular disease, impaired consciousness, and musculoskeletal damage [4].

On the other hand, a more recent systematic review supports that the aforementioned findings indicating potential neurological manifestations in patients with COVID-19 did not rely on robust laboratory evidence, whereas the determination of neurological symptoms associated with the new coronavirus requires further research on the prevalence and severity of these symptoms. However, researchers did not rule out the potential neurotropic and neuroinvasive effects of the new virus, which are similar to the pathogenetic mechanisms of other coronaviruses. In addition, the impaired mental state of patients is reported, but it has not been adequately studied due to other health-related conditions [5].

COVID-19; Neuropsychiatric Symptoms

Encephalopathy, as one of the neurological manifestations of the disease, seems to be associated with acute neuropsychiatric consequences such as delirium due to "cytocine storm syndrome". In addition, delirium in patients in need of intensive care was associated with more permanent and persistent neuropsychiatric outcomes of mild cognitive impairment in SARS-CoV-1 [10].

The symptoms of post-traumatic stress as long-term effects were present during previous coronavirus infections, although it is not clear whether such symptoms were attributed to the infection itself or to the host immune response. Depression, panic disorder, obsessive compulsive disorder, and pain disorder have been reported as post-traumatic responses in survivors of SARS-CoV-1 [11]. Furthermore, patients with psychotic disorders have been found to have coronavirus antibodies with no previous history of psychotic symptoms or mood disorders [12].

COVID-19; Neuropsychological Impact

Neurological and neuropsychological effects of the current coronavirus pandemic are beginning to appear and concern the scientific community, on the one hand due to the similar problems with the onset of the related SARS CoV and MERS viruses, and on the other hand due to the aggressive nature of SARS-CoV-2. Its immediate impact on the lungs, concomitant symptoms, isolation as a means of treatment, the ambiguity of the development, and the threat of death for the patient are factors that should not be underestimated in terms of the psychological consequences of the infection. Stress and depression are probably outcomes of the current life-threatening condition; however, they have been observed in patients previously infected with other viruses similar to the SARS-CoV-2. The spread of the virus to brain tissue, either due to the inflammatory response or due to vascular dysfunction, is very likely to be associated with a mild cognitive impairment, especially in the elderly [9].

Other delayed manifestations of coronaviruses of the same family (SARS-CoV-1, MERS) such as peripheral neuropathy, myopathy, Bickerstaff Brainstem Encephalitis (BBE), and Guillain-Barre Syndrome (GBS) have been linked to their demyelinating activity, as revealed in postmortem patient analyses [12,13]

Furthermore, the presence of CoV antibodies in the cerebrospinal fluid of Parkinson's patients [14] may indicate a link between coronaviruses and neurodegeneration. [15,16]

Conclusion

COVID-19 rapidly changed our global dynamics. The headache as a neurological manifestation, in addition to the main effect of the virus on the respiratory system, raised questions about the effect of the virus on the brain. Accompanying neurological events have been reported since the initial spread of the virus in China. Their severity and impact (short-term or long-term) have not yet been confirmed, as the most serious cases did not survive the pandemic.

Although COVID-19 is related to other viruses with known effects, its aetiology, pathogenesis and treatment remain unknown. Researchers are actively investigating the potential neuropsychological effects on survivors, although the evidence comes only from connections of viruses of the same family with only a few cases. However, future research should focus on the cognitive effects of the virus and its impact on cognition for both timely treatment and prevention. It is obvious that this pandemic forced us to engage in novel protective behaviors whilst we mourn thousands of victims. We are now on the trajectory of the next day and survivors need to expand scientific knowledge to prevent similar situations.

Conflict of interest

There is no conflict of interest for either of the authors.

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