

COVID-19 survivors and neuropsychological issues: A way forward

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Abstract

Background: This brief article focuses on highlighting the importance of possible neuropsychological manifestations among the Coronavirus Disease 19 (COVID-19) survivors. Studies have evidenced that like other Coronaviruses, COVID-19 is highly contagious and also responsible for the development of mild to severe respiratory symptoms. As COVID-19 is a recently emerged pandemic that has resulted in more than six hundred thousand deaths around the globe as of July 2020 and most of the researches has focused on the physical manifestations.

Purpose: The purpose of this review article was to highlight the importance of COVID-19 infection in perspective to mental health in those patients who manage to survive.

Methodology: For this purpose, an intensive literature review was conducted through different scientific search engines including PubMed, Google Scholars, Science Direct, etc.

Results and Conclusion: There is very limited data available on manifestations including psychological and neuropsychological. Studies have shown that viral infections including viruses from Coronaviridae have been implicated in the nervous system including the brain. So, it is important to investigate the post-COVID-19 infection in neuropsychological aspects. Such studies will highlight the importance of post-COVID-19 complications and will also help in redesigning the treatment plan for mental health.

Key words: COVID-19; Neuropsychological issues; Mental health; Coronavirus Disease-19 Survivors; Depression; Anxiety; Stress

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1 Introduction

Infections of the nervous system are comparatively rare as compared to other systems but nervous system infections can be potentially serious with poor prognosis.¹ In the nervous system, the central nervous system (CNS), which includes the brain and spinal cord, the main sources of contamination are haematogenic — adjacency and neural and the arterial being the main route of CNS.¹ CNS is not only infected with bacteria, but parasites and viruses can be also gain access to CNS especially the brain and its protective coverings, the meninges. Meningitis and

encephalitis due to viruses have been common but have not been reported in the past. However, recent studies have shown that viral meningitis as compared to bacterial meningitis cases has been increasing.² Due to the development of modern diagnostic tools, it has increased the identification of CNS infections.³

Among the viral infections, Coronavirus (CoV) is an RNA and enveloped virus that belongs to a medically important virus family, called Coronaviridae.⁴ Studies have shown that CoVs are zoonotic which means CoVs are transmitted from animals to humans, and this

received attention when a CoV like Severe Acute Respiratory Syndrome (SARS) was identified in the Chinese horseshoe bat in 2005.⁵ In addition to SARS, this group of viruses also includes other human pathogens including the Middle East Respiratory Syndrome CoV (MERS-CoV).⁶ Human pathogenic CoVs are responsible for the development of respiratory symptoms like flu, coughing, fever, bronchitis, common cold, and pneumonia.⁷ Previous studies have ruled out through experiments that coronavirus can cause infections that have diverse effects on the ciliary nasal epithelium, including the dysfunctionality of olfactory and gustatory sensations.⁸ Studies have also shown that CoVs are also responsible for the development of CNS illnesses like meningitis, encephalitis, and acute disseminated encephalomyelitis.⁹ Studies have also shown that CoVs are associated with transient or permanent neuropsychological and psychiatric issues.¹⁰

Recently, there is an emergence of a novel virus in the CoVs, called the Novel Coronavirus. The disease it causes is called Coronavirus Disease 19 (COVID-19). COVID-19 is a highly contagious and pathogenic disease that emerged in Wuhan city of China around December 2019 and became pandemic within two months.¹¹ According to the World Health Organization, the global data on morbidity and mortality as of April 17, 2020, showed more than 2 million and 0.14 million respectively.¹² COVID-19 mainly affects the respiratory systems with mild symptoms including flu, headache, dry cough, sore throat, muscle pain to severe symptoms which may include shortness of breath, trouble breathing, pain, or pressure on the chest.¹³ Studies as of April 2020 have focused on the physical implications and the prevention and treatment protocols. The neuropsychological aspects of the COVID-19 are not yet investigated. However, studies have shown that other viruses can target the CNS and are responsible for neurological alternation including brain inflammation and encephalomyelitis.¹⁴ Studies have shown that CoV-OC43 in humans is responsible for the development of encephalitis in children¹⁵ and a study also shown the presence of SARS-CoV RNA in the cerebrospinal fluid of patients infected with SARS.¹⁶

In addition to the neurobiological alteration, psychological issues like anxiety, stress, and

depression have also been observed due to a rising toll of deaths, economic crisis, and isolation because of lockdown.¹⁷ Anxiety and stress like symptoms are prevalent worldwide and the COVID-19 pandemic can be more damaging for those who are already experiencing these psychological symptoms. As the world is in this uncertain situation for long and people are in a constant phase of anxiety, this can affect the human body differently. The human brain triggers the release of cortisol and norepinephrine in the state of stress or anxiety, these chemicals cause increase in heart rate to get more oxygen from the blood and also resulted in shortness of breath. The excess release of these chemicals weakens the immune system, weight gain, and other heart diseases. Further, this chronic alteration in chemicals might be responsible for altering the brain structures, the chemical imbalance which may further be responsible for neuropsychological, clinical psychological, and behavioral issues. For this, there should be a protective approach that should be adapted for the COVID-19 survivors to identify any neuropsychological and behavioral issues which will not only help in designing the treatment plan but also open new research lines.

2 The Way Forward

To control and/or prevent any neuropsychological issue in the COVID-19 survivors, the following two approaches should be considered:

2.1 Clinical Psychology and Psychiatry

The pandemic situations result in the loss of lives and finances which may impact the psychological wellbeing of the survivors. A study in the African population has shown depressive symptoms among survivors of the Ebola virus disease.¹⁸ A study on SARS survivors has shown psychological distress even after one year of the outbreak. A study on SARS survivors has shown psychological distress even after one year of the outbreak. Besides, the presence of psychological distress among the health care workers of SARS survivors was the worry even after one year of the infection.¹⁹ These studies can reflect on the COVID-19 as it more contagious and pandemic, so COVID-19 might also be responsible for the development of psychological issues including stress, anxiety, and depression. So far, many studies have

shown the critical impact of COVID-19 on mental health. Because of the lockdown, the economic fall down has increased the poverty rate and social distancing has been imposed, especially the health professionals dealing COVID-19 on the frontline are in intense stress. Moreover, the vaccine for this virus is not yet developed so all these risk factors have contributed to psychological disturbances. In Pakistan, many types of research have been conducted revealing the psychological impact of COVID-19.²⁰ So, the importance of clinical psychologists and psychiatrists should not be ignored and psychological first aid, as well as long term psychological rehabilitation plan, should be designed for the COVID-19 survivors.

2.2 Neuropsychology and neuro-rehabilitation

Studies have indicated that the severity of the COVID-19 infection is linked with increasing age and a high percentage of above 80 years was hospitalized.²¹ People with old age are at a cognitive decline²² and thus, they can be more prone to cognitive dysfunction if infected. Recent data showed that coronavirus can cause neurological complications including dementia-like syndrome and old age people are on more risk. Besides dementia, there are also more chances of a new diagnosis of stroke and psychosis.²³

So, aged people after their survival from COVID-19 should be assessed for neuropsychological and/or any brain damage. This will help design a neuro-rehabilitation program for such populations. Also, physical activity, appropriate nutrition, social support, social interactions, and cognitive stimulation are important measures for reducing cognitive decline.²⁴ As during this COVID-19, around the globe, almost every country has declared lockdown and social distancing which has resulted to compromise above mentioned protective measures. This might be responsible for cognitive decline, especially in elderly subjects. Studies have also highlighted the impact of social behaviors on the cognitive deficit and it is shown that social isolation aggravates cognitive impairment.²⁵ It is known that interaction with environmental stimuli helps in cognitive maturation. But in the case of quarantine, this opportunity has decreased as well as the importance of physical activity could not be underestimated at this time which is also declined. One research showed that these

circumstances had created great risk for neurological impairments especially in older people.²⁶

3 Conclusion

Studies have suggested that COVID-19 can be associated with neuropsychological issues in COVID-19 survivors. These issues can be present just after the recovery or may prolong up to years or develop later in life. Present evidence is giving a signal of rehabilitation for the recovered patients as well as for the persons who are in chronic COVID-19 anxiety. The psycho-social effects including neurological aspects of this long-term uncertainty in the lockdown and social distancing have necessitated suitable neuropsychological rehabilitation programs. So, COVID-19 survivors should be monitored and assessed psychologically and/or neuro-psychologically for the assessment and management of psychological as well as neuro-psychological issues.

4 Conflict of interests

None declared by the authors

5 Authors' contribution

MR: Concept, experiments, writing

UB: Literature review, writing

JH: Writing, review

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