



Neuropsychological Sequelae and Posttraumatic Stress Disorder Post COVID-19

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Abstract

The explosion and the fast development of SARS-CoV-2, from December 2019 to till date, has imposed nations around the world to resolve virus control actions aiming to delayed the infection curve. The central emphasis are neurological and continuing cognitive difficulties. Concurrently, the incidence and nature of the cognitive sequelae of COVID-19 are undefined. Evidences have shown that a range of long-lasting symptoms can linger in the post era. However, little is known about the psychological sequelae of patients hospitalized for disease 2019 (COVID-19). This paper is an attempt which aim to review the symmetry, and harshness of cognitive impairments post COVID-19.

Keywords: COVID-19, Neuropsychological, Post Traumatic Stress Disorder.

1. Introduction

Severe acute respiratory syndrome coronavirus 2 disease which is termed as SARSCoV-2, the virus that origins COVID-19 was first spotted in the city of Wuhan in China, in the month of December 2019. It extended globally in 01 month of the onset. World Health Organization (WHO) affirmed it as epidemic throughout the world on March 11, 2020. The virus had spread to 220 countries in the world. As of February 28, 2023, there were nearly 761,071,826 world-wide COVID-19 cases. About 653,000,000 persons had improved from the disease, whereas there had been nearly 6,879,677 deaths (WHO, 2023).

In India, as on March 2023 the virus diseased over 44,696,984 people as confirmed cases of infection, and caused in over 530,808 deaths and 44,161,922 recovered people worldwide (WHO, 2023). The brutal second wave of COVID-19 in India which was on peak in May 2021 has left many people lurching and made us to feel that the pandemic is far from end s to grow. As nearly two years on from the first outbreak of COVID-19, embryonic therapies and possible vaccines has been emerged and tested, it is more and more important to understand and learn how the virus works and affects our health. As the number of infected people growing simultaneously number of recovered patients also increasing. Recovered patients are showing chronic requirements called as

“long-haulers” (Upham, 2021). Individual recovered from SARS- CoV-2 illness are suffering from many problems in normal functioning and are not all symptom-free. There are prospective chronic aftereffects of SARS-CoV-2 away from the early wave of acute illness those are exposing every day. As it is going to disclose, numerous neurological indexes or manifestations are upcoming to notice (Lahiri & Ardila, 2020). Neurological indexes may be divided into the central nervous system (seizures fatigue, dizziness, ataxia encephalitis, alteration of the sensorium headache and stroke (Davis et al., 2021) weakness, confusion, eye movement problems, and paralysis (Fotuhi et al., 2020), joint and bone pain, palpitations, insomnia, myalgia, anosmia, and ageusia) (Liotta et al., 2020; Ferrarese et al., 2020; Moro et al., 2020; Rodriguez-Morales et al., 2020) and the peripheral nervous system (hypogeusia and hyposmia and skeletal muscle injury) manifestations. A case series from Wuhan found that infected people admitted to hospital with SARS-CoV-2 had neurological manifestations (36%), frequently containing of mild symptoms like headache followed by dizziness (Mao et al. 2020). COVID-19 contamination is showing allied neuropsychiatric sequelae which includes cognitive impairment (Chung et al., 2020; Paterson et al., 2020; Mo et al., 2020; Wu et al., 2020; Troyer et al., 2020; Chen et al., 2020) and Posttraumatic Stress Disorder

(PTSD) (Liang et al., 2020; Sayed et al., 2021). Cognitive impairment particularly in patients with old age and extra severe cases, nonetheless few researches recommend that even patients of young age may be at danger (Oxley et al., 2020). Cognitive impairment or deficits are frequent, persistent in critical illnesses (Girard et al., 2018; Ariza et al., 2023) and gradually known as a common complication in COVID-19 infection. Previous pandemics (like the Russian flu of 1889-93, the Spanish flu of 1918, and Middle East Respiratory Syndrome (MERS) in 2012) have also confirmed various forms of neuropsychiatric symptoms, like encephalopathy, changes in mood, psychosis, neuromuscular dysfunction which might complement acute viral illness or may follow contamination in recovered patients (Von Economo, 1932; Honigsbaum, 2013; Kim, 2017) and

Posttraumatic Stress Disorder (PTSD) (Hawryluck et al., 2004; Sprang & Silman, 2013). Acute respiratory distress syndrome (ARDS), as a pulmonary symptomology has obtained much concentration during this pandemic, and shows that patients of ARDS, mainly those who have been on machine-driven ventilation may cultivate long-term cognitive impairments and cognitive problems (Zubair et al., 2020; Baker et al., 2020; Safavynia, & Evered, 2020; Liotta, et al., 2020) and Posttraumatic Stress Disorder (PTSD).

Cognitive impairment defines impairment of an individual's cognitive functions leading to the attainment of knowledge and information. It drives how a person understands and acts. The cognitive functions constitute: memory, attention, executive functions, information processing speed, visuospatial processing, decision making and judgement etc. Cognitive impairment ranges from mild to severe.

One enduring effect of COVID-19 which is going to be more and more obvious is its impact on cognitive dysfunction. One of the biggest-danger sets for severe indexes of COVID-19, individuals more than 65 years of age, frequently have cognitive impairment (MCI) and are previously at enlarged risk of restlessness as an effect of causal "neurocognitive frailty" (Safavynia et al., 2018; Safavynia & Goldstein, 2019). Cognitive dysfunctions are exhibited commonly in acute respiratory distress syndrome (ARDS) (Wolters et al., 2020; Wilcox et al., 2013) in 10% cases at longterm follow-up (Wolters et al., 2013). Zhou et al. (2020) indicated impairments in reaction time and sustained attention in 29 outpatients while Negrini et al. (2020) found deficits in global cognitive functions comprising attention and memory in a different study of nine patients. Problems with memory and thinking have been common among the symptoms (Becky, 2021) and can be often found months after

discharge from hospital in COVID-19 patients. Reduced speed of cognitive processing and impaired memory could inhibit with patients' daily routine and capability to coming back to work (Ferrucci et al., 2021). In a case series of another 57 patients, common dysfunctions were in divided attention and memory (Jaywant, 2021). In a study, 87 patients of COVID-19 infection, 80% patients presented deficits of cognitive functions related to attention, abstraction and memory in the subacute period of the infection. Even 70% of patients exhibited the same symptomology after one month of hospital discharge

(Alemanno et al., 2021). Neuropsychological changes have been testified with recurrent contribution of attention and frontal functions (Lahiri & Ardila, 2020) in individuals with worldwide preserved cognitive functions. A prospective cognitive impairment in recovered patients with COVID-19 infection presented particularly in the domain of sustained attention. (Zhou et al., 2020). Cognitive dysfunctions or issues related to memory have been the most frequent symptoms through all age people (88%) after six month of recovery from COVID19 illness (Davis et al., 2021). It is also reported that people have difficulty in finding the right words and recalling things that have been common to them like friend's name, familiar locations, and directions for

driving (Becky, 2021). Further 15% of patients after 39 months of illness were exhibited deficits in memory and concentration in Middle East respiratory syndrome (MERS) and severe acute respiratory syndrome (SARS)

(Rogers, 2020).

Patients recovered from their respiratory symptoms are possibly at high possibility for long-term left over neuropsychiatric and neurocognitive illnesses which include

Alzheimer's disease (Becky, 2021; Nath, 2020; Troyer, Kohn & Hong, 2020). The prospect that longer-term magnitudes of SARS-CoV-2 contamination (for which some advocate that the coronavirus itself come into the brain through the olfactory path) might in time give rise to other forms of dementia and Alzheimer's disease (de Erausquin, 2021). Greater risk for developing Alzheimer's disease may also be linked with the risk for developing cognitive impairment post-COVID-19 infection (Becky, 2021).

Neuropsychological impairments may have impact on executive functions, attention, and memory (Wilcox et al., 2013; Sheng et al. described symptoms of PTSD in 12.2% of COVID-19 patients. Other studies reported noteworthy symptoms of post-traumatic stress in 42.1% (Wesemann et al., 2020)

Furthermore, the clinical supervision of these individuals, comprising patient separation, lack of family members or visitors, reduced contact, and long ventilation/sedation, put them at danger for following cognitive deficits and traumatic

al., 2004). This can also be expected as a part of neurological consequences of this disease (Appelhans et al., 2021). Helms et al. (2020) conducted study on patients of COVID-19 with ARDS which showed that 15 of 45 patients presented executive dysfunctions syndrome at the time of discharge. Executive functions can be disturbed in daily life experiences which may lead to a short-term cognitive shift to routine behaviours (Schwabe & Wolf, 2013) with several diverse prolonged postCOVID-19 symptomology. These signs are assessed to be present in more than to one third of individuals with COVID-19 (Helms et al., 2020; Baker, et al., 2020; Mao et al., 2020). Deficits of memory, and executive functions were also categorized in 13 patients of severe COVID-19 during the post-acute stage (Beaud, 2021).

Along with cognitive deficits, Posttraumatic stress disorder (PTSD) may arise in persons who have a traumatic experience like COVID-19. Research from previous coronavirus epidemics, mainly the SARS in Hong Kong in 2003, also presented signs of PTSD (Kaseda & Levine, 2020).

and 96.2% (Bo et al., 2020) COVID-19 patients whereas Horn et al. (2020) reported that the occurrence of PTSD in COVID-19 patients was 6.5%.

stress. There is increasing sign of COVID-19 which a patient's danger factors, pathology, and behavioural way that can individually and synergistically add to the progress of prolonged cognitive decline and stress.

Clinical manifestations of PTSD may include recurring and disturbing memories, flashbacks and stopping of trauma-related cues (APA, 2013). COVID19 is related with

2. Conclusion

Though a key emphasis in the acute behaviour of hospitalized patients is to bound fatality, it has become clearer that there may also be important damaging prolonged effects of a COVID-19 illness (Miskowiak et al., 2021). As a final point, current evidences show that individual who have recovered from COVID-19 illness might be at enlarged risk of cognitive decline (Heneka, 2020). Another side stress and increased cognitive demands have also been established to produce short-term decrements in executive functioning (Yun, Krystal, Mathalon, 2010; Otto et al., 2013;

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Shields, Sazma, Yonelinas, 2016). It is unclear with the available literature of review and not enough to answer that why these deficits arise as a consequence of long-term COVID-19 illness or stress and enlarged cognitive demands.

Neurocognitive patterns as a result of COVID-19 have also not attained ample attention so far and studies on cognitive impairment and traumatic stress with COVID-19 is limited. This would be worth to explore further why individuals COVID19 infection shows cognitive

PTSD analyses in post illness phases with a prevalence of 32.2%. (Rogers et al., 2020). Qi et al. (2020)

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