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LONG-TERM NEUROPSYCHIATRIC CONSEQUENCES OF SARS-COV INFECTIONS

Osman Sinanović

Medical Faculty, University of Tuzla, 75000 Tuzla, Sarajevo Medical School, University Sarajevo School of Science and Technology, Academy of Medical Sciences of Bosnia and Herzegovina, 71000 Sarajevo, Bosnia and Herzegovina

SUMMARY

While the COVID-19 pandemic continues to spread globally, with relistic hope that will be solved with adequate vacination, more and more evidences are collected about the presence of psychiatric and neurological manifestations and symptoms associated with this diseas. Neurological manifestations, are part of the COVID-19 clinical picture, but questions remain regarding the frequency and severity of centra nervous system symptoms, the mechanism of action underlying neurological symptoms, and the relationship of symptoms with the course and severity of COVID-19.

The review of the so far published papers shows that although more and more papers are reporting neurological and psyhiatric manifestations associated with COVID-19, many items remain unclear. The long-term psychological implications of this infectious diseases should not be ignored.

In this paper, we aim to present a some of psychological consequences and neurological disorders associated with the SARS-CoV-2 infection, and to emphasize the need a global action that requires close coordination and open-data sharing between hospitals, academic and public health institutions and the fast establishment of harmonised research priorities to face acut and long-term the neurological and psychological consequences

Key words: COVID-19 – Neurological disorders - Psychiatric disorders - Long-term consequences

INTRODUCTION

Infection with the new corona virus (SARS-CoV-2) was first registered in December 2019 in China, and then later spread rapidly to the rest of the world. On December 31, 2019, the World Health Organization (WHO) informed the public for the first time about causes of pneumonnia of unknown origin, in the city of Wuhan (Hubei Province, China), in people who were epidemiologically linked to a seafood and wet animal whole sale local market in Wuhan. Coronavrus disease, called Corona virus disease 2019 (COVID-19), after China quickly spread to most countries in the wold, and the WHO on March 11, 2020 declared a pandmic with this virus. In Bosnia and Herzegovina, the first infected infected person was registered on 5.3.2020 in Banja Luka, and in the Federation of Bosnia and Herzegovina on March 9, 2020 in Konjic (Ghebreyesus 2020; Sinanović et al. 2020). COVID-19 is already affected a remarkably high proportion of the global population, which is unprecedented for a virus with such case fatality and infection rates in modern medicine. The most common presentation are respiratory symptoms ranging from mild flu-like illness to severe pneumonia, but a significant number of patients develop septic shock and multiple organ failure (Sinanović 2020). The most freuqent extrapulmonary manifestations include thrombotic complications, myocardial dysfunction and arrhythmia, acute coronary syndromes, acute kidney injury, gastrointestinal symptoms, hepatocellular injury, hyperglycemia and ketosis, neurologic illnesses, ocular symptoms, and dermatologic complications (Gupta et al. 2020).

By the time I finis this text (April 25, 2021), more than 147.000.000 people worldwide have been confirmed to be infected with SARS-CoV-2, more than 3.100.000 people have died due to COVID-19. Over 84.500.000 recovered were reported. These figures far exceed the SARS and MERS epidemics of 2002 and 2012 respectively.

In this paper, we aim to present a some of psychological consequences and neurological disorders associated with the SARS-CoV-2 infection, and to emphasize the need a global action that requires close coordination and open-data sharing between hospitals, academic and public health institutions and the fast establishment of harmonised research priorities to face acut and long-term the neurological and psychological consequences.

NEUROLOGICAL DISORDERS

The COVID-19, which is not just as a respiratory disease but also affects the cardiovascular, renal, and the nervous system functions (Huang et al. 2020; Yuki et al. 2020). SARS-CoV-2, in a number of patients penetrates the central nervous system (CNS), and apparently could be responsible for fatal outcome in some cases (Gandhi et al. 2020; Sinanović et al. 2020).

The entrry of the virus into the brain can lead to mild and more serious neurological (Neuro-COVID-19) and psychiatric manifestationss, which are not uncommon, including headache, anosmia, ageusia, encephalopathy, encephalitis, paresthesia, myalgia, Guillain-Barre syndrome, impaired consciousness, confusion or delirum and cerebrovascular diseases (Montalavan et al. 2020; Ellul et al. 2020; Sinanovic 2020). Reported neurological findings can be divided into three categories: central (headache (Mao et al. 2020; Wang et al. 2020), dizziness (Mao et al. 2020), impaired consciousness, acute cerebrovascular disease, ataxia and seizures), peripheral (hypogeusia, hyposmia) and musculoskeletal (Table 1) (Huang et al. 2020; Leonardi et al. 2020; Ahmed et al. 2020). Moreover, neurological involvement in COVID-19 corresponds to three situations: (a) neurological manifestations of viral infection, (b) post-infective neurological complications, and (c) infection in patients with neurological co-morbidity (Lahiri et al. 2020).

Table 1. Neurological complications and manifestations of COVID-19

Site	Manifestations
Central Nervous System	Dizziness
	Headache
	Acute cerebrovascular disease
	Impaired consciousness
	Transverse myelitis
	Impaired consciousness
	Transverse myelitis
	Acute hemorrhagic necrotizing encephalopathy
	Encephalopathy
	Encephalitis
	Epilepsy
	Ataxia
Peripheral Nervous System	Hypogeusia
	Hyposmia,
	Neuralgia
	Guillian Barre syndrome
	Skeletal muscle injury

Multiple cross-sectional studies have demonstrated that the incidence rate of olfactory dysfunction in COVID-19 patients varies from 33.9-68% with female dominance (Meng et al. 2020). Myalgia and muscle injury were reported in 10.7% of the cases in Wuhan (Mao et al. 2020) and rhabdomyolysis has been reported in another case from Wuhan (Jin & Tong, 2020). Many patients experienced hyposmia or anosmia, dysgeusia, dysarthria and either allodynia or acroparesthesias (Huang et al. 2020). Several cases of COVID-19 associated GBS have been also observed and published in different countris (Ahmed & Rathore, 2020; Zhao et al. 2020).

In a systematic review and meta-analysis of proportions of Favas et al. (2020) for articles published between 1st December 2019 to 25th June 2020 from: PubMed, MEDLINE, Scopus, EMBASE, Google Scholar, EBSCO, Web of Science, Cochrane Library, WHO database, and ClinicalTrials.gov., pooled prevalence of neurological manifestations were, smell disturbances (35.8%; 95% CI 21.4–50.2), taste disturbances (38.5%; 95%CI 24.0–53.0), myalgia (19.3%; 95%

CI 15.1–23.6), headache (14.7%; 95% CI 10.4–18.9), dizziness (6.1%; 95% CI 3.1–9.2), and syncope (1.8%; 95% CI 0.9–4.6). Pooled prevalence of acute cerebrovascular disease was (2.3%; 95%CI 1.0–3.6), of which majority were ischaemic stroke (2.1%; 95% CI 0.9–3.3), followed by haemorrhagic stroke (0.4%; 95% CI 0.2–0.6), and cerebral venous thrombosis (0.3%; 95% CI 0.1–0.6). They concluded that are common in COVID-19 and are even present as the only symptom without any other manifestation of the respiratory system involvement. Furthermore, they emphesised that some symptoms like smell and taste disturbance can be used as a screening tool for SARS-CoV-2 infection and can help isolate suspected patients earlier to avoid the spread of the disease.

LONG COVID-19 AND LONG-TERM NEUROLOGICAL IMPLICATIONS OF COVID-19

There is increasing awareness of the long-term symptoms and organ damage in patients with confirmed COVID-19 that persist after the acute illness. Although the term "long COVID" is now commonly used for these disorders, there is still no consensus on terminology, which includes chronic COVID syndrome, post-COVID-19 syndrome, post-acute COVID-19, and long-hauler COVID-19 (Del Rio et al. 2020; Anonymous 2020; Stefano 2021; Nalbandian et al. 2021).

Based on relapsing/remitting nature of post-COVID symptoms, the following integrative classification is proposed: potentially infection related-symptoms (up to 4–5 weeks), acute post-COVID symptoms (from week 5 to week 12), long post-COVID symptoms (from week 12 to week 24), and persistent post-COVID symptoms (lasting more than 24 weeks) (Fernández-de-las-Peñas et al. 2020). However, there is much that remains unknown, and the response to long COVID is still in its infancy. What are the diagnoses, definitions, and phenotypes of illness that are grouped under the term long COVID? How long does it last? Who is at risk of serious or prolonged sequelae? What are the underlying causes and mechanisms? How do we prevent or reduce the effects of such sequelae on patient health and wellbeing? Are there any effective treatments to aid patient recovery and the regain of full function? What rehabilitation is needed? (Anonymous 2020). Robust data and scientific evidence are essential to answer these questions. Large and long-term cohort studies are urgently needed to help better understand the trajectory, complications, and biological mechanisms that drive the long-term health consequences of COVID-19. These studies should include diverse populations, with both hospitalised and non-hospitalised patients, patients from primary and secondary care, and patients from a range of high-income, low-income, and middle-income countries. Minority ethnic groups and older people have been disproportionately affected by the pandemic, so ethnic and demographic factors must also be considered during patient recruitment. Patient perspectives regarding terminology of symptoms and recovery should be incorporated into study designs to ensure clinically meaningful research questions and outcomes. Multidisciplinary, multicentre, and multinational collaborations and approaches to data collection are required (Anonymous 2020).

Now it is well known that some patients with COVID-19 may develop various CNS abnormalities of central and peripheral nervous system, with potentially serious and long term consequences, including stroke and isolated psychiatric syndromes (Butler et al. 2020; Butler et al. 2020a). Furthermore, it is known from previous pandemics, such as so-called Spanish flu in 1918 and SARS in 2002, that there are not just acute effects of the viral infection but also long-term sequelae due to disease itself as well as social effects due to governmental measures of containment such as quarantine, social distancing, and lockdown (Kumar et al. 2021). Concerns have also been raised about post-COVID-19 parkinsonian syndromes, driven by the encephalitis lethargica epidemic that followed the 1918 influenza pandemic (Hoffman & Vilensky 2017). Namely, encephalitis lethargica is a neurological syndrome that spread across Europe and then the world beginning in the winter of 1916–17, and continuing into the 1930s. Although the exact number of people afflicted with encephalitis lethargica during the epidemic period is unknown, it is estimated to be more than one million worldwide (Ravenholt & Foege 1982). Those who survived were sometimes left with lingering and permanent neurological sequelae that rendered them nearly akinetic. Although 100 years have passed since the beginning of the epidemic period, many questions remain about this mysterious illness: What causes it? How is it transmitted? Could an epidemic happen again? (Hoffman & Vilensky 2017).

Taquet et al. (2020) emphasise, that their data provide some support for this possibility, although the incidence was low. So, Parkinsonism might be a delayed outcome, and patients after COVID-19 should be monitored longerin which case a clearer signal might emerge with a longer follow-up.

Given the global dimension of the current pandemic and the high transmissibility of the SARS-CoV-2 virus, the evidence that already exists about the association between this virus and the CNS, raises concerns about the potential long-term effects of COVID-19 on the CNS (Sinanović 2020), and strongly suggests that patients surviving COVID-19 are at high risk for subsequent development of neurological disease and in particular Alzheimer's disease (Heneka et al. 2020). Various adverse neurological and psychiatric outcomes occurring after COVID-19 have been predicted and reported (Roger et al. 2020; Ellul et al. 2020; Varathraaj et al. 2020; Taquet et al. 2021a). From the current point of view, it seems that in COVID-19 survivors, in the coming years and decades, the inflammatory systemic process and/or the inflammatory process of the brain could trigger long-term mechanisms that generally lead to an increase of neurological and neurodegenerative disorders (Sinanović et al, 2020; Heneka et al, 2020).

The mechanisms contributing to neuropathology in COVID-19 can be grouped into overlapping categories of direct viral infection, severe systemic inflammation, neuroinflammation, microvascular thrombosis and neurodegeneration (Heneka et al, 2020; Muccioli et al, 2020). While viral parts in the brain have previously been observed with other coronavirus infections (Desforges et al, 2014) there is not yet compelling evidence of SARS-CoV-2 infecting neurons. However, autopsy series have shown that SARS-CoV-2 may cause changes in brain parenchyma and vessels (Romero-Sánchez et al, 2020; Reichard et al, 2020).

In very recently publication (on April 6 2021) of Taquet et al. (2021a) who examined the associations of COVID-19 with neurological and psychiatric outcomes, in the following 6 months, estimation of incidence of a neurological and psychiatric diagnosis among 236 379 patients diagnosed with COVID-19 was done. They concluded that COVID-19 is followed by significant rates of neurological and psychiatric diagnoses over the subsequent 6 months. Namely, in the six months following a COVID-19 diagnosis, about a third of survivors had a neurological or psychiatric disorder and hazard ratios were substantially higher than in influenza (33.62%/95% CI 33.17–34.07) (control cohorts comprised 105 579 patients diagnosed with influenza) for most outcomes. The study replicates earlier findings of an increased risk of stroke (both ischaemic and haemorrhagic) as well as the more novel and concerning finding of an increased risk of incident dementia. Although the estimated incidence was modest in the whole COVID-19 cohort 2.66% of patients older than 65 years 4.72% who had encephalopathy, received a first diagnosis of dementia within 6 months of having COVID-19. The highest hazard ratio compared to influenza is for myoneural junction and muscle disease, but the specific nature and aetiology of this remains rather unclear So, consistent with several other reports (Siow et al., 2020; Hernandez-Fernandez et al. 2020; Xie et al. 2020), in this study, the risk of cerebrovascular events (ischaemic stroke and intracranial haemorrhage) was elevated after COVID-19, with the incidence of ischaemic stroke rising to almost one in ten (or three in 100 for a first stroke) in patients with encephalopathy (Taquet et al. 2021a).

PSYCHIATRIC CONSEQUENCES OF COVID-19

Due to the fact that iformation about the diseas caused by SARS-CoV-2 (COVID-19) spread very quickly, outside China, confirming the remarks that it is very contagious disease, but also a fatal disease, the general public already at the beginning of pandemic become very upset (Dong et al. 2020; Jakovljevic et al. 2020). Apart from respiratory and multiorganic disorders, it was inveitable to expect that such a large pandemic with numerous uncertainities, drastic changes in everyday life among a significant number of inhabitans of the planet, and even our country would lead to psychological difficulties for a significant number of population, including health workers.

Among the first reports is a study by Xiao et al. (2020) who analyzed the presence of stress sympotms, anxiety and sleep quality, and the impact of social support on these symptoms, in 170 residents in central China during the COVID-19. They found a high level of stress and anxiety, as wll as poor sleep quality in most respondents, and a positive correlation in terms of their lower presence with adequate social support. According to a study by Liu et al. (2020) who analyzed 285 respondents over the age of 18 in

Whuan and surroundig cities, where the COVID-19 epidemic started in China, a month after the outbreak, symptoms of post-traumatic stress disorder (PTSD) were present in 7% of subjects. Women had significantly more frequent symptoms of re-experiencing, both repression and arousal, and in the domain of cognition and mood. Subjects who had better sleep quality also had fewer symptoms of PTSD. The authors note that this is the first study on this topic and remind that in earlier study done in Taiwan, after the SARS epidemic, the incidence of depressive symptoms in the sample tested was 3.7% (Ko et al. 2006).

Maunder (2004), studying the psychological consequences of the SARS epidemic in the first half of 2003 in Canada, nots that it was an unpredictable trauamtic event for health workers in Toronto. It is estimated that 29-35% of health workers have experienced a high level of distress. The nurses were in the greatest distress, then those who had contact with SARS patients and those who had children. The lessons they have learned are: efforts are needed to mitigate the psychological impact of actions in controlling infection, especially the interpersonal distance that these actions have promoted; effective risk information and education is a priority in the early stages of the epidemic; health professionals can play a role in influencing good media reporting patterns, that can increase or decrease the general morale of the population; health workers need to have psychological support within the health system as well as cleare practical support that facilities their hard work during an epidemic. High scores on the impact event events in nurses, who had contact with SARS patients, and significant negative impact of social isolation and fear for health, were reported in another study from Toronto (Maunder et al. 2004).

Huang and Zhao (2020) published the results of study, conducted during the COVID-19 epidemic in China, based on an online cross-sectional survey that included 7.236 voluntaries. They determined the overall prevalence of generalized anxiety disorder in 35.1%, depressive symptoms in 20.1%, and sleep quality disorder in 18.2%. Compared to other peofessionals, health workers were more likely to have poorer sleep quality. Age less than 35years and focusing on the COVID-19 pandemic (TV, internet cell phone, thinking about infection and consequences) for more than three hours a day was associated with greater anxiety, and in the case of health workers with poorer sleep quality.

In review article, Röhr et al. (2020) analyzed 13 studies examining the psycchosocial consequences of quarantine measures during the COVID-19 pandemic, noting that these measures were associtaed with negative psychosocial outcomes, including depressive sympotms, anxiety, anger and stress, PTSD, social isolation, loneliness and stigmatization. Based on the analysis, the authors concluded that quarantine isolation measures during the COVID-19 pandemic have huge negative consequences for mental health; and that preventive interventional measures to reduce psychosocial consequences should be an integral part of the crisis response during pandemic conditions. The second review article, which was based on a review of 28 published papers in journal included in PubMed indexing, and which delt with the effects of the COVID-19 pandemic on menal health, it was concluded that symptoms of anxiety and depression (16-28%) and stress (8%) are common psychological reactions to the COVID-19 pandemic and are also associtaed with sleep disorders (Rajkumar 2020).

LONG-TERM PSYCHIATRIC CONSEQUENCES OF COVID-19

Even if patients with COVID-19 recover physically, they are vulnerable to long-lasting mental health problems. Long-term psychological distress with symptoms of anxety and depression, and post-traumatic stress disorder can develop in more than half of patients who survive critical illness. Furthermore, depression following critical illness is associated with an increased mortality risk in the first 2 years following discharge from intensive care unit (ICU) (Hatch et al. 2018). While there is no long-term data on the psychological effects of COVID-19 infection and treatment, an earlier study of patients hospitalized for SARS found that more than one-third had moderate to severe depression and anxiety 1 year after physical recovery (Lee et al. 2007). The mental health effects of surviving COVID-19 may be further compounded by loneliness and isolation, job and economic loss, increased child care and familial responsibilities, and guilt if family members or other contacts contract the virus. Finally, COVID-19 survivors may experience chronic pain, which is commonly reported by ICU survivors (Devine et al. 2019), potentially compounding the epidemic of opioid misuse already affecting many of the same vulnerable populations.

In a recent paper already mentioned above (Taquet et al. 2021a) the estimated incidence of a neurological or psychiatric diagnosis in the following 6 months was 33·62% (95% CI 33·17–34·07), with 12·84% (12·36–13·33) receiving their first such diagnosis. Regarding individual diagnoses of the study outcomes, the whole COVID-19 cohort (236 379 patients) had estimated incidences of 0·67% (0·59–0·75) for dementia, 17·39% (17·04–17·74) for anxiety disorder, and 1·40% (1·30–1·51) for psychotic disorder, among others. In the group with intensive therapy unit admission, estimated incidences were, 1·74% (1·31–2·30) for dementia, 19·15% (17·90–20·48) for anxiety disorder, and 2·77% (2·31–3·33) for psychotic disorder. Most diagnostic categories were more common in patients who had COVID-19 than in those who had influenza (hazard ratio [HR] 1·44, 95% CI 1·40–1·47, for any diagnosis; 1·78, 1·68–1·89, for any first diagnosis). As with incidences, HRs were higher in patients who had more severe COVID-19 (eg, those admitted to ITU compared with those who were not: 1·58, 1·50–1·67, for any diagnosis; 2·87, 2·45–3·35, for any first diagnosis). Unlike the other study, and in line with previous suggestions (Watson et al. 2021), they also observed a significantly increased risk of psychotic disorders, explaning that difference by reflection the larger sample size and longer duration of follow-up in their research. Substance use disorders and insomnia were also more common in COVID-19 survivors than in those who had influenza or other respiratory tract infections (except for the incidence of a first diagnosis of substance use disorder after COVID-19 compared with other respiratory tract infections).

The immediate psychological sequelae SARS-Cov-1 otbreak in 2003 were similar to those reprоted in the current COVID-19 pandemic (Chua et al. 2004), as well as one year after the outbreak (Lee et al. 2007). The immediate psychological sequelae of SARS have been included significantly higher stress levels among affected individuals, compared with matched healthy control subjects, as well as poor sleep, depressed mood, weepiness, nightmares, and poor concentration (Chua et al. 2004). Acute psychosis was also observed in a some individuals (Lee et al. 2004). Namely, Lee et al. (2007) found that SARS survivors had higher stress levels during the outbreak, compared with control subjects ($P<0.01$), and this persisted 1 year later ($P<0.01$) without signs of decrease. In 2004, SARS survivors also showed worrying levels of depression, anxiety, and post-traumatic symptoms. During the outbreak, health care worker SARS survivors had stress levels similar to those of non–health care workers, but health care workers showed significantly higher stress levels in 2004 ($P<0.05$) and had higher depression, anxiety, posttraumatic symptoms. So this study shows that, instead of abating with time, stress levels remained persistently elevated one year after the outbreak. Stress levels of health care worker SARS survivors actually increased over the period. As a group, the SARS survivors showed worrying levels of psychological distress one year after the outbreak, as demonstrated by the alarmingly high levels of depression, anxiety, and posttraumatic symptoms, as well as by a high prevalence of potential cases of psychiatric morbidity. Moreover, the strong correlation among the different stress and psychological distress indices means that survivors were affected simultaneously by a multitude of psychological problems and were not merely struggling with isolated problems. Finaly Lee et al. (2007) cocluded that the situation of health care worker SARS survivors is particularly worrying. The long-term psychological implications of infectious diseases should not be ignored. Mental health services could play an important role in rehabilitation.

The long-term psychiatric consequences of COVID-19 likely share similarities with those observed during the SARS outbreak where, following physical recovery, 50% and 20% of survivors continued to exhibit anxiety and depression, respectively, with people treated with antiviral and corticosteroid medications also exhibiting significant memory problems (Tsang et al., 2004). During the convalescence phase, SARS patients also frequently suffered from post-traumatic stress disorder (PTSD), with the lowest level of blood oxygen saturation (SaO_2) during hospitalization being the most significant predictor for intrusion and avoidance symptoms in one study (Wu et al., 2020). The reports on the long-term mental health sequelae in COVID-19 patients confirm some of the above findings. Namely, in one study 12.2% had PTSD symptoms, 26.8% had anxiety and/or depression symptoms. In addition, 53.6% of patients reported chronic fatigue 3 months post-COVID-19 infection (Qi et al., 2020; Mukaetova-Ladinska & Kronenberg, 2020).

While health workers, and a vast army of essential professionals continue to battle COVID-19 on the front lines, policymakers and payers must look to-

ward the future. There needs to be a comprehensive plan for preventing and managing post-COVID-19 complications and supporting patients and families experiencing delayed morbidity and disability as a result. Health protection and policies should extend beyond the present and ensure that COVID-19 kills as few people as possible now and the future (Jing & McCoy, 2020).

CONCLUSION

The consequences of this pandemic on the overall life of people on the planet are significant and unthinkable. COVID-19 is primarily a disease of the respiratory system, but SARS-CoV-2, the RNA virus that causes the disease, in a number of patients also penetrates the CNS, leading to serious neurological disorders, and apparently it is also responsible for mortality.

Furthermore the entrry of the virus into the brain can lead to neurological and psychiatric manifestationss, which are not uncommon inluding headache, anosmia, ageusia, encephalopathy, encephalitis, paresthesia, myalgia, Guillain-Barre syndrome, impaired consciousness, confusion or delirum and cerebrovascular diseases. Psychosocial consequences as well as consequences for mental health are also significant, both for the general population and especially for health workers of all profiles. Many items remain unclear and this uncertainty calls for a global action that requires close coordination and open-data sharing between hospitals, academic and public health institutions and the fast establishment of harmonised research priorities to face acute and long-term post acute COVID-19 complications and psychological consequences. Services need to be configured, and resourced, to deal with this anticipated need. Neurologists, psychiatrists, and caregivers should be alerted to a possible increase in such cases in COVID-19 survivors. Prospective studies are needed to investigate potential correlations between acute and sub-acute COVID-19 infections and long-term neurological sequalae in this patient cohort in spite of relistic hope that this pandemic will be solved with adequate vacination.

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Correspondence:
Professor Osman Sinanović, MD, PhD
Medical Faculty, University of Tuzla, Univerzitetska 1, 75000 Tuzla, Sarajevo Medical School, University Sarajevo School of Science and Technology, Hrasnička cesta 3a, 71210 Ilidža, Sarajevo, Bosnia and Herzegovina
E-mail: osman.sinanovic1@gmail.com

SAŽETAK

Iako se pandemija COVID-19 nastavlja širiti globalno, sa realnom andom da će se to riješiti sa adekvatnom vakcinacijom, prikupja se sve više dokaza o prisustvu psihijatrijskih i neuroloških manifestacija i simptoma sa ovom bolešću. Neurološke manifestacije su dio kliničke slike COVID-19, ali ostaju pitanja u vezi sa učestalošću i težinom simptoma povezanih sa središnjim živčanim susatvom, mehanizmima koji stoje iza neurološkoh simptoma i povezanošću simpotma sa tijekom i težinom COVID-19.

Pregled do sada objavljenih radova pokazuju da, iako je sve više i više saopštenja o neurološkim i psihijatrijskim manifestacijama povezanim sa COVID-19, mnoga pitanja ostaju nejasna. Pored toga, dugoročne psihološke implikacije ove infektivnih bolesti se ne bi trebale ignorirati.

U ovom radu želimo prikazati neke psihološke posljedice i neurološke poremećaje povezane sa SARS-CoV-2 infekcijom i naglasiti potrebu za globalnom akcijom koja zahtijeva blisku koorodinaciju i otovrenu razmjenu podataka između bolnica, akademskih i javnih institucija i brzo uspostavljanje harmoniziranih istraživačkih prioriteta kako bi se suočili sa akutnim i dugoročnim neurološkim i psihološkim posledicama.

Ključne riječi: COVID-19 – Neurološki poremećaji - Psihijatrijski poremećaji - Dugoročne posljedice