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**Rajabov Muzaffar Nematovich, Ashurov Zarifjon Sharifovich, Yadgarova Nargiza
Fakhritdinovna, Userbayeva Roza Kuralbayevna**

MENTAL DISORDERS AMONG THE POPULATION DURING THE COVID-19 PANDEMIC

Tashkent Medical Academy, Republic of Uzbekistan, Tashkent

Abstract.

The new coronavirus SARS-CoV-2 was revealed at December 2019 in Wuhan, China, rapidly spread over the world and caused global pandemic. The main clinical feature of COVID-19 is a severe acute respiratory deficiency. With the accumulation of new studies, it is clear that the coronavirus causes neurological damages ranged from light (headache, anosmia) to severe acute (encephalitis, meningitis, cramps, strokes et set) in 1/3 patients with COVID-19. In this review we describe symptoms and neurological manifestations in patients infected SARS-CoV-2, structure of this virus, mechanisms of its penetration in cells, probable pathways of neuronal cells infection and pathogenetic mechanisms of neurological damages. Also we pay special the attention to the beginning and development of psychological and psychiatric problems originated from the pandemic.

Key words: new coronavirus infection, mental disorders, mechanisms of development of mental disorders in new coronavirus infection.

INTRODUCTION

COVID-19 primarily causes a crisis that threatens physical health, however, if appropriate measures are not taken, it can lead to serious mental health problems. Even in the best of times, good mental health is essential to community activities. Mental health must be at the centre of every country's efforts to combat the COVID-19 pandemic. This crisis has had a major impact on the mental health and well-being of communities around the world and remains a priority that needs to be addressed urgently. Psychological stress has become the most common among the population. Many people have experienced stress as a result of the direct impact of the virus on their health and physical isolation. Many feared infection, death and loss of family members. People were separated from their loved ones and colleagues. Millions of people suffer economic hardship as a result of loss of livelihoods or sources of income. The main reasons for concern were often misinformation and rumors about the virus, as well as uncertainty about the future. All of this can dramatically increase the number and severity of mental illness over a long period of time [20].

With the help of serine protease (TMPRSS2), the virus and the membrane of the host cell merge, and the RNA genome of the virus is able to penetrate the attacking cell [8, 10, 17, 31]. Then its translation occurs, it forms two polyproteins and a structural protein and begins replication of the viral genome. The newly formed envelope glycoproteins line up in

the membrane of the endoplasmic reticulum and the Golgi apparatus, resulting in the RNA genome and proteins nucleocapsid is formed by a nucleocapsid. The viral particles then enter the endoplasmic reticulum and the Golgi apparatus, bind to the plasma membrane, and exit the cell [14, 21]. However, SARS-CoV-2 has a higher affinity than ASE 2, so it has a high pathogenicity and is easier to penetrate the cell than sars-CoV, MERS-CoV viruses. Since ASE-2 receptors are also expressed in the central nervous system, it can be assumed that the penetration of the SARS-CoV-2 virus into the nerve cell occurs through these receptors, which leads to neurological symptoms and damage to brain tissue [14, 21]. Two possible pathogenetic mechanisms are put forward that lead to the development of various neuronal-neurological complications: direct invasion of the virus into nervous tissue or maladaptive inflammatory reaction [17, 27].

Clinical picture. The main target of COVID-19 disease is the respiratory system. But the disease affects not only the respiratory system. Severe neurological symptoms are observed in more than a third of patients [1, 13, 14, 20]. It is important to note that the appearance of neurological symptoms indicates a deterioration in the course of the disease and an unfavorable prognosis. Because of this, timely detection and adequate treatment of neurological disorders can be crucial in the treatment of patients with the virus SARS-CoV-2. Based on

the analysis of data from a number of original studies and meta-analyses, the following main symptoms of COVID-19 can be identified when considering cases confirmed by laboratory tests (PCR) [5, 15, 16, 18, 19, 27, 28, 30]: high fever was observed in 77-98.6% of patients; dry cough - 59.4% - 82%; fatigue, fatigue - 78 38.1% - 75%; sputum - 33.4% - 56%; dyspnea - 18.6% - 36.7%; sore throat - 5% - 13.9%; headache - 6.5% - 34%; myalgia and joint pain - 11% - 34.8%; tremor, 11.4 per cent; nausea, vomiting - 5% - 17.3%; nasal congestion - 4.8%; diarrhoea, 3.7 per cent, 12.9 per cent; vomiting of blood - 0.9% - 3%; redness of the conjunctiva - 0.8%; dizziness, 9.4 per cent; abdominal pain - 2.2% - 5.8%; lymphopenia - 70.3% - 75.4%; increase in prothrombin time - 58%; mental disorders, 9 per cent; nasal discharge - 4%; back pain - 2%; anorexia - 12.2%. Many research groups note that the severity of symptoms depends on the immune response. In the early stages of infection, there is a decrease in immunity, the number of lymphocytes decreases, the concentration of C-reactive protein in the peripheral blood of COVID-19 patients increases [11, 30]. A cytokine storm involving secondary hemophagocytic lymphohistiocytosis is an unexplored but fatal complication for COVID-19 patients. Although the virus is known to be found in the blood of some infected people, the disease is asymptomatic [25, 26]. Such patients can be carriers of the disease.

Psychological and mental disorders in COVID-19. The very rapid spread of COVID-19 and limited treatment options have led to increased anxiety and panic attacks in a number of countries amid the pandemic. Anxiety disorders, xenophobia, anxious demand for various brands, various conspiracy theories and theft are increasing among the population. According to the US press, cases of aggression, violence and alcoholism have become more frequent. Quarantine, isolation, social distance, as well as self-isolation affect the psychological state of the entire population. Psychological responses to the pandemic include defensive responses in the form of inappropriate behavior, such as emotional distress and anxiety, fear, frustration, anger, feelings of loneliness, boredom, depression, self-avoidance [24]. This pandemic is characterized by a specific syndrome called "head stress disorder": a strong emotional response in the form of stress and anxiety. This syndrome can also have physical symptoms: a

strong heartbeat and insomnia, which can later lead to these mental disorders. Similar reactions have been detected after the PANDEMICS of the SARS-CoV, MERS-CoV and Ebola viruses. In the early stages of the pandemic in China, between 7% and 53.8% of the population experienced psychological distress. However, the following negative psychological reactions were observed: in addition to anxiety, depression and stress, insomnia, dissatisfaction, anxiety for loved ones and one's own health, sensitivity to social risks, dissatisfaction with life, phobias, humanity, compulsive behavior, antisocial behavior, somatic symptoms [13, 24]. Stress, anxiety and depression ranged from moderate to severe. Among students, mild, moderate, and severe anxiety accounted for 21.3%, 2.7%, and 0.9%, respectively. It has been established that the level of anxiety and stress depends on the level of education, gender and age of a person [24]. If we consider the psychological impact of the pandemic on the population, it is necessary to divide them into several groups: medical personnel, COVID-19 patients and patients with pre-existing mental illnesses. It has been shown that during the pandemic there is a high risk of negative psychological trauma, especially with direct contact of medical personnel with patients [4, 12, 24]. 27.39% - 71.5% of medical professionals develop stress, 50.4% - depression, 34.0% - insomnia, 29.04% - 44.6% - anxiety [12, 13, 16]. Most of the symptoms were mild to moderate. Severe, moderate, and mild anxiety were distributed at 2.17%, 4.78%, and 16.09%, respectively [16]. Relatively severe symptoms were observed in middle and small medical personnel, women and young people working in the "red zone". In general, there is no significant difference between the psychological reactions of the general population and the medical personnel who worked closely with the patients. Psychopathological symptoms in patients with COVID-19 appear for several reasons: clinical signs and the development of the disease, side effects of ongoing drug treatment, a sense of danger, fear of infecting others, social isolation, insecurity, physical discomfort, negative media reports [24]. Clinically stable, 96.2% of COVID-19 patients had symptoms of psychological problems and stress disorders leading to a decrease in quality of life and impaired performance. During the course of the disease,

significant stress is observed, especially in the elderly contingent. Depression, anxiety in 55%, psychosomatic symptoms were observed in 50% of patients with COVID-19. Depression was more severe in married patients with a positive PCR result, with more somatic complaints detected in patients with a negative PCR result; 67.92% of these patients suffered from insomnia, and about 25% thought about suicide. With regard to patients with pre-existing mental disorders, it should be noted that during the pandemic they received less attention than required and often did not receive inpatient treatment. Such patients often have chronic somatic diseases and poor overall health, which in turn increases their susceptibility to SARS-CoV-2 infection. In psychiatric patients with COVID-19, the effectiveness of treatment is lower and they have a higher emotional response to the disease [2]. Our research has shown that the psychological and mental disorders during the COVID-19 pandemic did not differ significantly from those observed during other epidemics and emergencies. In our opinion, the main reason for the emergence and development of mental and psychiatric disorders during this epidemic is the need for prolonged social isolation and its adherence in the media.

Possible mechanisms for the development of mental complications in COVID-19. It is known that in the event of an epidemic and even a pandemic, the number of mental illnesses increases due to the development of stressful situations associated with infection and fear of death, quarantine and social isolation. In people sensitive to stress, in such a stressful situation, the stress-dependent corticotrophic hormone (CRH) is released from neurons in the hypothalamic-paraventricular nuclei (PVL) and binds to CRH receptors, activating the hypothalamic-pituitary-adrenal (GPN) axis. stimulates release of the anterior lobe of the pituitary gland adrenocorticotrophic hormone (ACTH) [7, 23]. An increase in ACTH in the blood leads to an increase in the concentration in the blood of glucocorticoids, which bind to glucocorticoid receptors (GR) expressed in various organs, including the brain [9]. Hyperactivation of effector glucocorticoids and glucocorticoid receptors on the HPA axis leads to the expression of stress-related genes and induces different types of behavior. In addition to reactivating the HPA axis, impaired expression of stress-related genes increases susceptibility to exogenous stress

[6]. Exogenous stress can alter the epigenetics of the SERT, BDNF, GR, FKBP5, CRHR genes through various mechanisms such as DNA methylation, chromatin modification, and histone deacetylation. Such changes in the expression of these genes lead to transcription disorders and the development of stressful diseases [22]. It is safe to assume that strong exogenous, including psychological stress, can lead to the development and exacerbation of mental illness in the event of the COVID-19 pandemic. One possible mechanism for the disease could be activation of the HPA axis and alteration of epigenetic modifications of stress-related genes. Stress can also increase susceptibility to SARS-CoV-2 infection and exacerbate a patient's condition [29].

CONCLUSION

The vast majority of patients with COVID-19 experience neurological complications, such as headache, dizziness, nausea, vomiting, increased tension of the neck muscles, impaired sense of smell and taste, as well as psychological and mental disorders. Although in many cases such symptoms may seem insignificant against the background of acute respiratory diseases, cases of encephalitis, meningitis, cerebral circulation disorders, depression and other mental disorders have nevertheless been identified. The appearance of neurological symptoms in patients with COVID-19 indicates an unfavorable prognosis for the course of the disease, so the prevention of such symptoms can be crucial for treatment.

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