NEUROLOGICAL CHANGES OBSERVED IN POST-COVID SYNDROME

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INTRODUCTION. The causative agent of the new coronavirus infection SARS-CoV-2 is the pathogen responsible for the development of COVID-19, it is a multi-organ disease with a wide range of symptoms.[1,6,7] The completion of the acute phase of coronavirus infection varies in duration. This can be learned from dynamic monitoring of millions of patients who have been ill over the past 2 years. In a third of patients, the acute inflammatory period of the disease can pass without any consequences.[7,8] When the disease has severe clinical manifestations, most patients experience various clinical signs and residual complications. Often these residual complications are proportional to the severity of the disease; in some cases, the consequences of the disease and residual symptoms do not depend on the period of acute inflammation.[1,2,4] This is not the problem we want to focus on. In a certain proportion of patients, residual complications and secondary syndromes affect the quality of life for several months and require special attention and special correction. The symptoms of these adverse events are very diverse, and cover dysfunction of many organs and systems and require the formation of a polymorphism of secondary and delayed complications. The term "polymorph" can have any phenotypic basis (morphological, physiological, biochemical, behavioral including the trait can be used at the genetic level. [8,9] COVID-19 has caused unprecedented numbers of cases and deaths worldwide, and at the same time, there were many reports of subacute and long-term consequences for many organs and systems.

Early data on COVID-19 analyzed residual complications such as fatigue, shortness of breath, chest pain, cognitive impairment, arthralgia, and decreased quality of life.[1] These consequences can lead to the production of inflammatory cytokines and cell damage as a persistent immune system response.[9,10]

Multimorbid residual complications or signs arising after COVID-19 illness, observed with a predominance of one or another symptom and syndrome. Taking this into account, we decided to analyze the post-Covid syndrome that occurs after infection with the new coronavirus.

Purpose of the study: Analysis of neurological changes in post-Covid syndrome.

Materials and research methods: The material for the study was obtained from outpatient records of patients who were treated in a hospital registered at the central multidisciplinary clinic of the Samarkand City Medical Association. As research materials, blood, urine, feces were taken, as well as general laboratory tests of blood, urine, feces, blood biochemistry, a study of the blood coagulation system according to Sukharev, determination of D-dimer, procalcitonin, ferritin indicators, instrumental MSCT of the chest, ECG. The examination methods used included EEG and ultrasound. The results were retrospectively analyzed statistically.

Discussion of the study: in patients under observation, residual clinical manifestations after COVID-19 disease manifested themselves as follows:[7,8]

30.7% of patients fully recovered within 4 weeks of onset of COVID-19. 45.6% of patients had subacute or protracted form of COVID-19. In this group of patients, some COVID-19 symptoms persisted for 4-12 weeks. In 23.7% of patients, symptoms after the acute period of COVID-19 disease became chronic. These included symptoms and disorders persisting after the 12th week of the acute phase of the disease.

Cardiovascular system (14.5%) concomitant diseases in patients, chronic lung diseases (11.7%), kidney diseases (7.6%), diabetes mellitus (25.7%) and stage II obesity (15.6 %) and III degree (8.4%), HIV infection (5.8%), tuberculosis (4.7%), chronic liver diseases (6%) and others.

In publications in 2021, it is customary to call changes after the acute period of COVID-19 post-Covid syndrome (Post-COVID-19 syndrome, or Long Covid). Post-Covid syndrome (ICD-10) is included in the 10th edition of the International Classification of Diseases as “Condition after COVID-19” “Post COVID-19 condition” [8,10] In 2020, the British International Health Association proposed the following classification of post-Covid cases:

- acute COVID-19 (if symptoms persist for 4 weeks);
- prolonged course of COVID-19 (if symptoms persist for 4 to 12 weeks);
- post-Covid syndrome (symptoms of the disease lasting more than 12 weeks,

- unexplained by other diagnoses, change from time to time, appear and disappear with damage to many organs and systems)

1- table.

Damage to organs and systems and their clinical manifestations in the post-Covid period in patients under observation

Damaged organs and systems	Syndromic symptoms of diseases	%
The cardiovascular system	Heart attack, arrhythmias, hyper- and hypotensive syndrome, chronic heart failure, thrombosis of various locations.	23%
Respiratory system	Obstructive bronchitis, intercostal neuralgia, prolonged painful cough, prolonged persistence of wheezing.	13,5%
Digestive system	State of dysbacteriosis, intestinal dysfunction, persistent flatulence.	5,6%

Nervous system	Depressive conditions, headache, insomnia, memory loss, forgetfulness of professional skills, lifestyle changes, immobility, constant state of fear, vegetative-vascular dystonia, stroke, disorders of smell and taste, encephalopathy, encephalitis, polyradiculoneuritis, cerebrovascular complications.	21,7%
Kidneys and excretory system	If the patient has previously suffered from kidney disease, with COVID-19, dysfunction of the genitourinary system, chronic renal failure, impaired spermatogenesis in men.	7,6%
Endocrine system	Transient hyperglycemia due to dysfunction of the pancreas, damage to the adrenal glands, changes in the production of hormones TSH, T3, T4 due to dysfunction of the thyroid gland.	9,6%
Musculoskeletal system	Scattered pain in muscles, joints, arthritis of unknown etiology, myositis.	11,2%
The immune system	The immune system response in the post-COVID-19 era is neither adaptive nor well understood. A strong inflammatory process developed in the body, and other organs and systems were involved in the process. It was noted that after the acute period of COVID-19 disease, patients maintained high levels of C-reactive protein, ferritin and ESR levels for a	7,8%

	certain period of time after the acute period of COVID-19 disease.	

The table shows numerous changes after the disease, during which the disappearance of the primary respiratory syndrome was observed with varying degrees of severity of damage to the pulmonary bronchi. All these cases can be combined with the term “polymorphism” (symptoms, syndromes, diseases). Patients had residual symptoms for 1 year (Table 1). When we analyzed the rate of changes in systems, it became clear that changes in the cardiovascular system and nervous system predominated (Fig. 1).

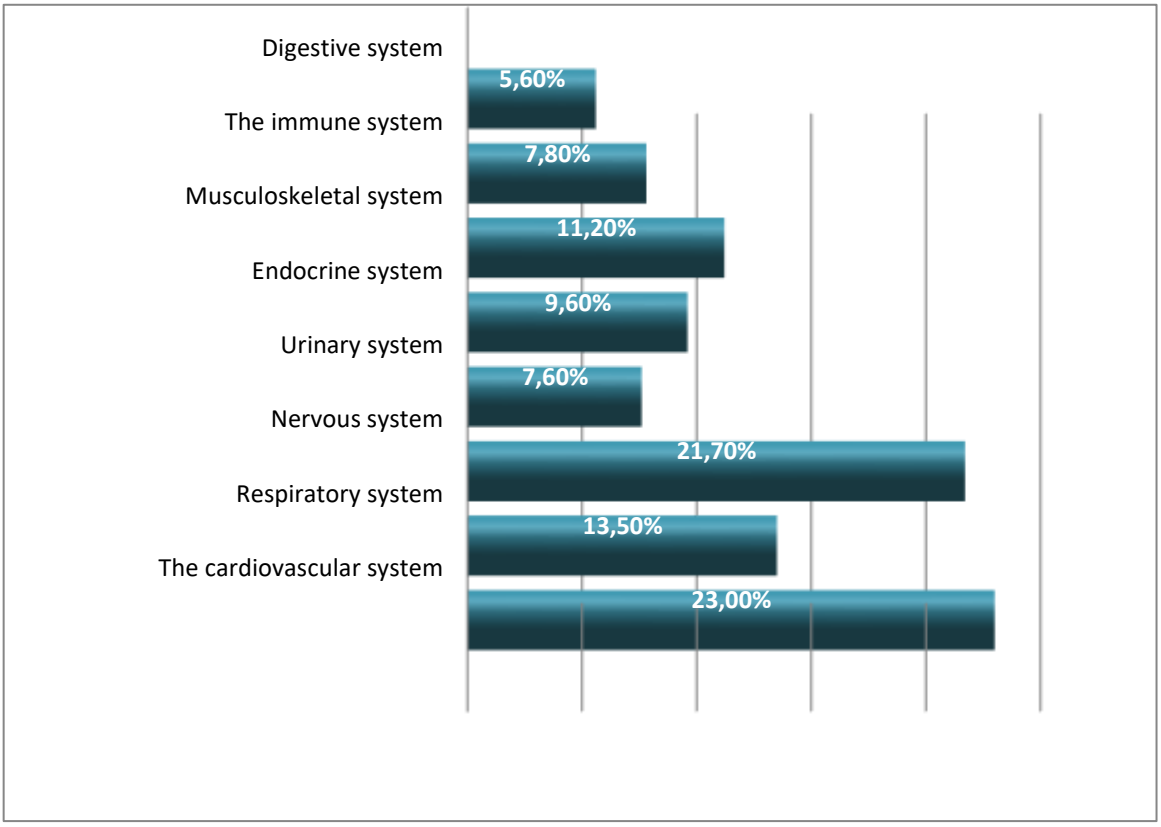

Figure 1. The rate of occurrence of changes in organs and systems during post-Covid syndrome

At the present stage of studying COVID-19, we can say that the polymorphism of markers lies in the ability of the virus to grow in many tissues, since the APF2 SARS-CoV-

2 receptor is involved in the primary inflammatory process. In addition to systemic genetic, neurological, hormonal and other control of the disease, dysfunction may occur. Pathophysiological abnormalities in COVID-19 disease are multifactorial and include microvascular ischemia and injury, immobility, and metabolic changes in severe disease. In addition, during the COVID-19 pandemic, patients were included in the risk group for infection with bacterial, fungal and other pathogens after the acute period of the disease. Changes after acute illness have not been sufficiently studied in large clinical trials. The acute period of the disease leaves certain damage in the body, and in some cases occurs in a mild form and is not excluded from the number of secondary syndromes. Most often, these residual syndromes occur in older people or in people with a complex of concomitant diseases, which, in turn, causes poor outcomes of the disease. [4,5]

However, the issue of studying these conditions in clinical practice is still discussed in the literature. We examined the course of SARS-CoV-2 against the background of concomitant diseases, mainly in the acute period. It should be remembered that the functioning of any body system is almost always controlled by an ensemble of genes, which normally exists in normal balance. In the acute period of the COVID-19 disease, a number of comorbid conditions are observed, which lead to a severe course of the disease, an unpleasant outcome of the disease and the development of post-Covid syndrome. These are diseases of the cardiovascular system, kidney failure, diabetes mellitus, lung diseases, obesity, endocrine diseases, liver diseases, intestinal dysfunction, etc.

Conclusion: Considering that neurological changes identified during post-Covid syndrome have a negative impact on the subsequent lifestyle of patients, it is necessary to conduct a number of studies to analyze the duration of post-Covid syndrome and correction methods for COVID -19.

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