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STUDY AND ANALYSIS OF SIGNS OF DAMAGE OF THE NERVOUS SYSTEM IN PATIENTS WITH POST-COVID SYNDROME

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ABSTRACT. In order to assess the damage of the nervous system in patients with post-covid syndrome, patients with post-covid syndrome were selected from the population. 358 outpatient and inpatient treated patients were examined, the clinical course of the disease in them is based on neurophysiological, cognitive examinations and the application of modern methods of treatment. Patients between the ages of 18 and 60 with varying degrees of severity of COVID-19 were selected for the study. The average age of the patients was 35.4±1.68. 63.7% of the examinees were women and 33.6% were men. All patients were divided according to age gradation classification approved by WHO. According to it, patients aged 18-24 made up 6.2%, patients aged 25-44 made up 54.7%, patients aged 45-59 made up 28.5% and 10.6% of patients were over 60 years old. The results showed that Post-COVID Syndrome was more common among patients aged 25-44 years. The group with the lowest indicator was made up of patients aged 16-24. Therefore, correcting the psychoemotional system and cognitive dysfunction of patients remains an actual problem today.

Keywords: Post-COVID syndrome, psychoemotional state, depression, anxiety, cognitive disorders, COVID -19.

Relevance. In December 2019, an epidemic of viral pneumonia associated with the new coronavirus began in Wuhan, China. It was originally called Wuhan virus or the new coronavirus of 2019 [1,2,3,4,5,6,7,8,9,10]. This epidemic, which was initially local, has become a global pandemic with unstable and tragic consequences. In February 2020, the official taxonomic name of the new virus was determined as severe acute respiratory syndrome (SARS) related coronavirus type 2 (CoV), (SARSCoV-2) and the disease it causes, COVID-19 [2,11,12,13,14,15,16]. On January 30, 2020, the World Health Organization declared this epidemic a public health emergency, and then a global pandemic. Studies have shown that the infection of COVID-19 not only causes serious damage to the human body in the acute period, but also its symptoms last for a long time, giving rise to the term post-COVID syndrome (PS) [1,17,18,19,20]. The first, after Elisa Perego, a citizen of Lombardy, was infected with Covid-19, she described the clinical course and the long duration of the disease and called it Long Covid (post-COVID syndrome) on Twitter. In June 2020, Long Covid (Post-COVID Syndrome) term spread on social media and it was described by Dr. Jack Suet [2,21,22]. Clinical manifestations of PS are increasing day by day. Taking this into account, it was entered into the International classification of diseases (MKB-10) with the code U09 [2,23,24]. PS (long COVID) is a complex of complications not explained by an alternative diagnosis that lasts from 4 to 12 weeks and in 2.3% of cases longer in patients with COVID-19. According to world statistics, 49% of patients infected with COVID-19 in the USA, 50% in Germany, and 35-45% in England experience various disorders observed in the nervous system after the disease.

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Purpose of the work. Assessment of the degree of damage to the nervous system in patients with post- COVID syndrome.

In order to evaluate the neurological features of post- COVID syndrome, we studied the prevalence of post-covid syndrome and the expression of neurological symptoms in the population of Bukhara region.

Research materials and methods. The study is based on the results of clinical neurological examinations of 358 patients collected during 2020-2023. Among these examinees, diagnosis of PS was made in 31.6% of patients up to 12 weeks, in 41.3% of patients up to 24 weeks, in 27.1% of patients after 24 weeks. 130 (36.3%) of the patients were men and 228 (63.7%) were women. During a comprehensive clinical examination of all patients, we studied detailed data and medical documents of subjective and objective symptoms of COVID 19 viral infection. The following examinations were performed on each patient: anamnesis collection, clinical-neurological examinations, neuropsychological tests, examination of the vegetative nervous system.

Research result. 358 patients with post-COVID syndrome were classified according to the duration of the disease and according to the manifestation of neurological symptoms. According to it, the largest share, i.e. 60.3%, was made up of patients from 4 to 12 weeks of illness. The lowest rate was observed in 8.9% of cases in patients whose illness was more than 6 months. The decrease in PS over time was reliably regressed. But even after 6 months, it was found that the symptoms of the disease were preserved. Damage to the psychoemotional status among the examined patients accounted for the largest share of 64.5%. Damage to the central nervous system was found in 22.1% of cases, and peripheral nervous system damage in 13.4% of cases.

When analyzing the symptoms of damage to the central nervous system in patients with PS, parkinsonian syndrome of serious importance, hyperkinesis, syncopal states, dyssomnia, thermoregulation disorder and even Klein-Lewin syndrome were encountered. (Table 1). Depending on the duration of PS, thermoregulatory disorders were 26.5% and dyssomnias were 17.7% among patients with these symptoms from 1 to 3 months compared to other periods and showed reliably high indicators, that is, it was observed a lot in the early periods of PS. Of the extrapyramidal disorders, parkinson's syndrome and hyperkinesias accounted for 2.5%, and were more often manifested in the late period of PS. Syncopal states, dyssomnia, thermoregulation disorders decreased over time. But there were also cases that it persisted for up to a year.

Table 1. Manifestation of central nervous system (CNS) damage in relation to the duration of the syndrome in patients with PS (n=79) %.

Damage symptoms / Syndrome duration	1-3 months	3-6 months	After 6 months
Parkinson's syndrome	0	1.3±0.9%	2.5±0.6%
Hyperkinesis	1.3%±0.6	1.3±1.1%	2.5±0.8%
Klein-Lewin syndrome	0	1.3±0.6%	0
Syncopal states	7.6%±0.9	6.3±0.8%	2.5±0.5%
Dyssomnia	17.7% ±0.5**	10.1±0.8%	7.6±0.7%
Violation of thermoregulation	26.5%±0.7 *	8.9±0.9%	2.5±0.6%

***-P<0,001 **-P<0,05**

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When analyzing symptoms of cranial nerve damage in patients with PS, symptoms of hyposmia (anosmia) and dysgeusia were the most common (Table 2). 62.1% of patients had symptoms of hyposmia, 37.9% had symptoms of dysgeusia. Over time, the symptoms regressed.

Table 2. Manifestation of cranial nerve damage symptoms in relation to the duration of the syndrome in patients with PS. (n=358)

The duration of the syndrome	Hyposmia (anosmia)	Dysgeusia
1-3 months	46.9±1.4%*	32.9±0.9%
3-6 months	12.1±1.1%	3.9±1.3%
After 6 months	3.1±1.3%	1.1±0.8%

***-P<0,001**

Peripheral nervous system damage in PS in 1-3 months was polyradiculoneuritis 2.1%, plexitis 20.8%, radiculitis 31.2%, mononeuritis 12.5%, in 3-6 months was polyradiculoneuritis-0, plexitis 6.2%, radiculitis 14.6%, mononeuritis 4.2% , after 6 months was polyradiculoneuritis 2.1%, plexitis 2.1%, mononeuritis -0, radiculitis 4.2%. (Table 3).

Table 3. Manifestation of symptoms of damage of the peripheral nervous system (PNS) in relation to the duration of the syndrome in patients with PS. (n=48)

The duration of the syndrome	Polyradiculoneuritis	Plexit	Radiculitis	Mononeuritis
1-3 months	2.1±1.1%	20.8±2.1%**	31.2±1.2%*	12.5±1.1%
3-6 months	0	6.2±1.1%	14.6±.8%	4.2±1.2%
After 6 months	2.1±0.9%	2.1±0.9%	4.2±1.2%	0

****-P<0,001 *-P<0,05**

The vegetative nervous system was examined through vegetative tone (VT), vegetative reactivity (VR), and vegetative supply of activity (VSA). VT was checked based on the Guillaume-Vain table, VR was checked using the Danin-Ashner test, and VSA was checked using orthoclinostatic tests (Table 4).

Table 4. Detection of symptoms of vegetative nervous system (VNS) damage in relation to the duration of the syndrome in patients with PS (n=231).

The duration of the syndrome	Sympatheticotonia			Vagotonia		
	VT	VR	VSA	VT	VR	VSA
1-3 months	29.8±1.5%	37.6±1.1%	32±1.1%	6.9±0.9%	18.2±1.1%	13.8±1.1%
3-6 months	22.1±2.1%	26.8±1.5%	22.9±2.1%	9.1±1.1%	4.8±0.9%	7.8±1.3%
After 6 months	17.3%±1.3*	9.9±1.6%	19.9±1.8%	14.7%±0.9*	2.6±1.2%	3.5±1.1%

***P>0.05 **P>0.01**

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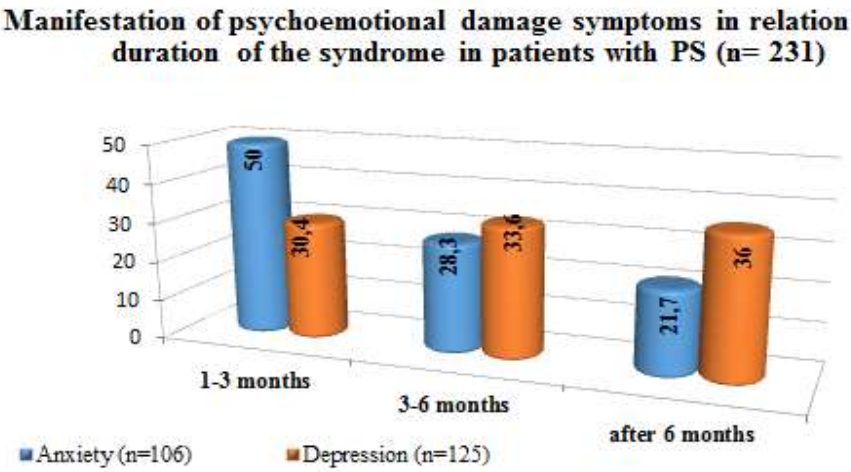
The height of the state of sympathicotonia showed a decrease it over time. But the vagotonic indicator took a slightly different shape in VT. Instead of decreasing over time, it increased. In VR and VSA, vagotonia regressed over time, as did sympathotonia. This showed that the limbic system is more affected among the suprasegmental structures. That's why the vagotonic indicator in it became progressive instead of regression. In the analysis of VR, symptoms of sympathicotonia and vagotonia were stabilized at an average level of reliability compared to other examinations.

Psychoemotional status disorders accounted for the highest percentage of patients with PS (Fig. 1). The Gamelton scale, which assesses anxiety and depression, was used to assess this condition. According to the indicators of this scale, 50% of patients had anxiety, 30.4% had depression in 1-3 months, 28.3% had anxiety, 33.6% had depression in 3-6 months, and 21.7% had anxiety, 36% had depression after 6 months. Anxiety symptoms regressed uniformly over time. But depression remained the same during all periods of the disease. The anxiety symptom in psychoemotional status did not have a high degree of reliability in relation to the duration of the disease, but a regressive change was observed. It is natural that regression of anxiety in such a case occurs in the initial period of any disease and decreases in the final stages. But the stability of the depressive syndrome and even its numerical increase in some cases showed that depression in PS has a deep place in the psychoemotional state of the patient.



***P>0.05 **P>0.01**

Figure 1. Manifestation of psychoemotional damage symptoms in relation to the duration of the syndrome in patients with PS (n= 231)

The clock drawing test was used to determine the impaired cognitive function in patients with PS, and the MMSE (Mini–mental state examination) scale was used to determine dementia. The results of the clock drawing test in patients were as follows. As a result, healthy people made up 67.6%, patients with cognitive impairment made up 32.4%. (Table 5).

Table 5.

Results of the clock drawing test, which assesses cognitive function impairment in patients with PS (n=358) %

10 points	67.6 %
8-9 points light cognitive impairment	26.3 %
6-7 points obvious cognitive impairment	4.2 %
4-5 points light dementia	2 %

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3 points > obvious dementia	0

Summary. In conclusion, the coronavirus infection has the characteristic of having a serious effect on the nervous system in relation to the respiratory system. In some cases, chronic degenerative diseases of the nervous system may develop due to this infection. Especially the deepening of psychoemotional and cognitive dysfunctions over time can be considered one of the serious complications of the post-covid syndrome. Therefore, correcting the psychoemotional system and cognitive dysfunction of patients remains an actual problem today.

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