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Infectious and Parasitic Diseases

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LESSONS OF THE GLOBAL COVID-19 PANDEMIC IN RELATION TO THE QUALITY OF EDUCATION

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The global COVID-19 pandemic has had a profound impact on humanity, affecting not only physical health but also neurological, social, and ecological well-being. Neurological and psychological disorders can negatively impact learning quality and significantly worsen learning outcomes for higher education students. The aim of this study is to compare the prevalence and evaluate the symptoms of post-COVID-19 syndrome among senior students in two higher educational institutions, Poltava State Medical University and Poltava National Pedagogical University named after V.G. Korolenko. The impact of these symptoms on the quality of education will also be assessed through analysis of the author's questionnaire. Rehabilitation measures will be recommended to improve quality of educational process. It has been determined that there is a high level of damage to the nervous system among students from both universities, which is accompanied by a combination of symptoms including headache, memory impairment, insomnia, anxiety, unmotivated weakness, and excessive fatigue. The aforementioned complaints and the need to increase time for completing educational tasks after illness, along with memory impairment and sleep disturbances, suggest that the academic performance, psychological state, and psychosomatic background of students are at a low level. Therefore, recommendations for cognitive rehabilitation of this category of applicants are necessary, taking into account their significant educational load. The samples were made by senior year students. Physical activity levels among senior higher education students may exacerbate post-COVID-19 syndrome symptoms. Recommendations for the physical rehabilitation of this patient group are necessary. Applicants experiencing weakness, increased fatigue, reduced work capacity, sleep disturbances, and mood instability should review the organization of the educational process in distance learning conditions and make changes to their lifestyle.

Keywords: *students of higher education institutions, post-COVID-19 syndrome, long COVID-19, trucker syndrome.*

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Introduction

The recent global pandemic has had a significant impact on humanity's physical condition, as well as on neurological, social, and ecological well-being. It has highlighted the importance of a sense of security for the psychological self. Despite the passage of time, the detrimental effects of social distancing, quarantine, and lockdown on social connections and daily routines, resulting in feelings of isolation, anxiety, and depression, continue to be observed [1]. In March 2023, the US Centers for Disease Control and Prevention (CDC) released data indicating that SARS-CoV-2 is still causing a substantial financial burden. 74.5% of American adults, which amounts to 176.1 million people, are at an increased risk of severe course of this disease. CDC data from the summer of 2023 indicates a rise in infectious diseases cases. Hospitalizations increased by 14.3%, and deaths increased by 8.3%. The three most common variants of SARS-CoV-2 that caused infections were Omicron: EG.5 Eris (20.6%), FL.1.5.1 Fornax (13.3%), and XBB.1.16 Arcturus (10.7%) [2]. Due to the ongoing war in Ukraine, there is a lack of statistical control over the disease and its consequences. It is important to note that SARS-CoV-2 is a highly variable virus, with new mutations potentially increasing its contagiousness.

However, although the incidence of the disease has decreased worldwide, concern about this virus remains high. Some individuals may experience health issues for an extended period of time following an acute bacterial or parasitic infection, as well as after contracting SARS-CoV-2. This condition is referred to as post-SARS-CoV-2 syndrome (PSS) or post-COVID-19 syndrome (PCS). The National Institute for Health and Care Excellence (NICE) has defined this syndrome as symptoms that develop or persist for 3 or more months after the onset of SARS-CoV-2 disease and do not fit into any of the known nosologies. This condition can last from 5 to 12 weeks or longer and may manifest as general weakness, prolonged cough, shortness of breath, loss of taste or smell, sleep disturbance, anxiety, depression, headache, joint syndrome, hair loss, and disorders of the endocrine system [3]. Since the start of 2021, the International Classification of Diseases ICD-10 has included a new condition called "Post SARS-CoV-2 condition" or "Long COVID". Individuals experiencing the long-term effects of this condition are commonly referred to as "long haulers". Although patients may experience complaints in multiple organs, the majority of their symptoms are related to cognitive disorders. It is evident that the disease has not completely subsided, and its long-term consequences persist. Long COVID and PCS are complex conditions that require further research. Researchers have identified 287 distinct clinical manifestations of Long COVID. The rapid mutation of the SARS-CoV-2 virus, emergence of new strains, and the need for global surveillance, research, and prevention of post-COVID lesions remains critical and relevant worldwide [4].

SARS-CoV-2 is a virus that causes a multisystem inflammatory disorder. Therefore, the symptoms of PCS are also diverse. The development of PCS is based on immune dysfunction, hyperactivation of chemokine and cytokine pathways of the immune response, and the initiation and activation of autoimmune processes, resulting

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in inflammatory processes. PCS can develop in patients with any severity of the virus, ranging from mild to severe. Persistent consequences have been observed in individuals who did not require hospitalisation or experienced mild illness. Late or persistent symptoms have been noted, and in some cases, medical complications have arisen, leading to long-term impacts on both physical and mental health. Symptoms such as severe fatigue, shortness of breath or difficulty breathing, joint pain and chest pain, sleep and memory disturbances, impaired concentration, muscle or headache, fast or rapid heartbeat, confusion, general anxiety (which is the result of not only the viral effect, but also quarantine restrictions and isolation), mood changes, depressive states, negative and even suicidal thoughts, hallucinations, changes in smell, visual, auditory and tactile disturbances, psychological symptoms were frequently observed [5–8].

When examining the correlation between age and the incidence of coronavirus infection, it was anticipated that the younger population would have a notably lower disease frequency. It is evident from the data on SARS-CoV-2 virus infection that the morbidity of children is primarily linked to quarantine measures and home isolation [9; 10]. In addition, the analysis of literature data and the results of our own research showed that the damage to the nervous system during coronavirus infection, as well as PCS, is characteristic of all age groups.

The initial year of the pandemic demonstrated that the elderly are more vulnerable to the disease. However, it was subsequently discovered that the effects of PCS are present across all age groups. The largest study conducted by German scientists among almost 12,000 children and adolescents has been published on the medrxiv.org portal. The data on coronavirus morbidity in children aged 5 to 17 years was carefully studied by doctors. It was found that children also experience PCS, which is characterized by increased anxiety, rapid fatigue, and headaches.

A study conducted in Italy on 129 children revealed that 42.6% of them experienced at least one symptom for more than 60 days after contracting the coronavirus. The UK Office for National Statistics estimated that 12.9% of children aged 2–11 years and 14.5% of adolescents aged 12–16 years still experienced symptoms 5 weeks after contracting a coronavirus infection [11]. Additionally, the researchers discovered that in children, the effects of the coronavirus primarily impact the nervous system and mental health.

Insufficient attention is given to the prevention and elimination of the psychological consequences of SARS-CoV-2 during early adulthood, which is the most productive period of a person's life. This period is significant for performing important biological, psychological, and social functions such as creating a family, giving birth, raising children, and building a successful professional career. Undoubtedly, during early adulthood, the human body has a high regenerative potential, and mental and physical resources are at their peak of development. Therefore, the negative consequences of a coronavirus infection are less pronounced, and the prognosis is more favourable.

This cohort of patients, aged between 20 and 30 years, includes students. However, students, who are an intermediate group between children and adults, were not included in most statistical treatments and analyses. It is important to note that students, particularly those in higher education and senior courses, are one of the most vulnerable categories of the population.

Furthermore, students in higher education studying medical courses are among the most vulnerable groups. Many of them work in medical facilities and, as a result, have been exposed to a significant viral load during the pandemic. It is evident that

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these circumstances may impact the learning process and the quality of education.

However, there is a growing global concern regarding the mental health of young people. Recent statistics on mental disorders in children show a 47% increase in the prevalence of attention deficit disorder and a 37% increase in the prevalence of adolescent depression. Shockingly, one in five children worldwide has a mental disorder. The impact of the coronavirus pandemic has only exacerbated this issue.

Disorders of the central nervous system during the post-infectious period of viral infectious diseases, such as influenza and parainfluenza, have been previously observed and documented by both domestic and foreign authors. The SARS-CoV-2 virus was no exception. After clinical and laboratory recovery, the nervous system was found to be the most vulnerable of all organ systems in the long term [12]. The impact of SARS-CoV-2 on mental health is currently the subject of many studies by specialists worldwide.

SARS-CoV-2 is capable of affecting the central nervous system through perivascular and transneural entry, resulting in neurotropic and neurovirulent effects on the hypothalamus, limbic complex, brain, and trunk structures. Therefore, it is statistically likely that every third patient will experience nervous system disturbances, such as sleep disturbances, difficulty falling asleep, frequent awakenings, feelings of breathlessness, and depressive and asthenic states, within the next 2–3 weeks after an infection. This indicates the development of an asthenic syndrome following a coronavirus infection, which is characterized by increased fatigue, mood instability, sleep disturbances, decreased concentration of attention, decreased endurance in relation to mental and physical exertion, and headaches. These symptoms may lead to depression. Additionally, autonomic reactions such as sweating, shortness of breath, and tachycardia may occur.

However, there is currently no comprehensive list of symptoms that are characteristic of PCS, and the spectrum of symptoms is constantly being updated and supplemented. Moreover, the distinction between long-term SARS-CoV-2 and PCS is currently based only on the duration of the above-mentioned symptoms.

It is important to consider that the pandemic has brought about significant changes in the way people of all ages live, work, and learn. The restrictions on movement and the shift to remote work and education have resulted in significant stress on the nervous system and eyesight, as well as hypodynamia. These factors have compounded the negative impact of COVID-19 infection. Unfortunately, the cognitive consequences of the disease can persist for several months. Therefore, there is a need to develop universal cognitive screening tools, including for young patients, to detect reduced cognitive functions early after a coronavirus infection. Medical approaches to treating post-COVID-19 syndrome should be based on available evidence.

In a study, it was found that 59.7% of hospitalized patients and 67.5% of non-hospitalized patients experienced at least one post-COVID-19 symptom two years after infection ($p=0.01$). The most frequently reported symptoms were fatigue and memory loss. There were no significant differences in post-SARS-CoV-2 symptoms between the two groups of patients. SARS-CoV-2 infection primarily affects the lungs, but it can also cause severe damage to other organ systems, including the central nervous system. Neurological disorders associated with SARS-CoV-2 vary in severity, from mild symptoms such as headache or myalgia to more severe symptoms such as stroke, psychosis, and anosmia [13].

An analysis of 10,979 studies has revealed that a considerable number of individuals experience persistent fatigue and/or cognitive impairment following an acute

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SARS-CoV-2 illness [14]. The analysis of 1,458 articles included 19 studies with 11,324 patients. The prevalence of neurological symptoms following SARS-CoV-2 infection includes fatigue, clouding of consciousness, memory problems, attention deficit disorder, myalgia, anosmia, dysgeusia, and headache. Neuropsychiatric conditions such as sleep disturbances, anxiety, and depression have also been reported. The incidence of neuropsychiatric symptoms showed a significant increase during the mid- and long-term follow-up periods. Patients who were hospitalized for acute SARS-CoV-2 disease had a lower incidence of symptoms such as anosmia, anxiety, depression, dysgeusia, fatigue, headache, myalgia, and sleep disturbances three months or more after infection. However, hospitalization was associated with a higher frequency of memory problems. Cohorts of patients (>20%) admitted to ICUs during acute SARS-CoV-2 had a higher prevalence of fatigue, anxiety, depression, and sleep disturbances than cohorts (<20%) without ICU admissions [3]. Subsequent studies have shown that non-hospitalised 'long haulers' with SARS-CoV-2 experience severe and persistent cognitive impairment and fatigue, which significantly affect their quality of life [15]. Furthermore, they continue to experience neurological symptoms, fatigue, and impaired quality of life for up to 14.8 months after the initial infection [16].

Considering that neurological and psychological disorders can have a negative impact on the quality of learning and significantly worsen the academic performance of higher education students, a study was conducted. The study involved the development of a questionnaire by the author, which took into account the most common symptoms found in PCS. The prevalence of these symptoms among higher education students was then analyzed.

The aim of the research is to compare the prevalence and evaluate the symptoms of post-COVID-19 syndrome based on the analysis of the author's questionnaire. Additionally, it aims to identify the possible influence of these symptoms on the quality of education among senior students in two higher educational institutions in the city of Poltava: Poltava State Medical University (PSMU) and V.G. Korolenko Poltava National Pedagogical University. Develop a rehabilitation plan to enhance the quality of the educational process.

Materials and Methods

The analysis of literary data from 2020–2023 identified the main symptoms of post-SARS-CoV-2 syndrome. An anonymous questionnaire for surveying students was created by the authors. The questionnaire collected data on age, SARS-CoV-2 infection status, infection course, disease frequency, diagnosis method, presence of post-COVID-19 syndrome symptoms, and physical activity. Gender was not taken into account. 200 valid randomized questionnaire results were obtained from 100 senior year students of the Poltava State Medical University (PSMU) and 100 senior year students of the V.G. Korolenko Poltava National Pedagogical University (PNPU), aged 20–25, which made up 2 research groups. Prior to administering the questionnaire, the participants were provided with an explanation of the terminology used. All interviewees signed a voluntary consent to participate in the research.

Statistical calculations were performed using the "STATISTICA 8.0 for Windows" (Dell, USA).

Results and Discussion

To assess PCS, consider the presence of more than two complaints that are typical according to literature screening and that appeared after the disease was taken into account. Therefore, the frequency of manifestations of this syndrome corresponded to the literature data [17], and 94% of patients exhibited symptoms.

The diagnosis of coronavirus disease was mainly verified through PCR in 46.51%

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and 37% of cases, respectively. A positive result was obtained through a rapid test in 21% and 34% of cases, while typical clinical symptoms (such as loss of taste and smell) were used to diagnose the disease in about 30% of cases in both samples. The majority of respondents (62.7% and 68.9%) reported falling ill once, while 33.7% and 26.6% reported falling ill twice. More than 3 times was reported by only 3.5% and 4.5% of respondents, respectively. 56% of respondents reported experiencing the disease in a mild form (the indicator coincides in both samples).

Out of the pedagogical university students surveyed, only 45% had contracted coronavirus, indicating a significantly lower number. The reason for this outcome can be attributed to the remote form of education, which limited exposure to sick individuals. It is worth noting that medical university graduates had a high viral load, likely due to the fact that a majority of senior students also worked in medical institutions. The two universities did not show significant differences in the diagnosis verification process, with 37% of cases being diagnosed through the PCR method and 34% through a rapid test.

Although the percentage of ill patients among the pedagogical university students is significantly lower (45%) compared to the medical university students (86%), both groups had an equal number of students with more than two complaints from the questionnaire list. The total morbidity rate for both groups was 65.5%, and the expression of post-COVID-19 was 35%.

In terms of frequency, the main symptoms of post-COVID-19 were distributed as follows: in first place – frequent and/or long-lasting headache in 35% of the general population (52% and 61% of respondents of PSMU and PNPU, respectively). In second place, 28% of respondents (46.5% vs. 39%) reported sleep disturbances and difficulty falling asleep. Thirdly, 27% had joint and/or muscle pain. More than 50% of PSMU students said they needed more time to complete an educational task after an illness. However, at the pedagogical university, 70% of applicants felt unmotivated weakness or excessive tiredness. The same 46.5% of medical students reported memory problems and sleep disturbances or difficulty falling asleep. The most common somatic complaints were: loss of taste and/or smell within 2–6 months (26.0%); shortness of breath, especially on exertion (22.5%); palpitations or heart pain (17.5%).

The analysis of the psychological status showed that 10% of the students of both universities began to feel anxiety, which was not present before the disease, and 16.5% felt depression or apathy. These indicators have an impact on the quality of training and require mandatory screening and referral to a specialist, and cannot be ignored given the specific nature of the future activities of future specialists. An interesting fact is the fact of seeking qualified medical help for the above-mentioned complaints. To the question "Have you ever sought medical help in connection with existing complaints?", there was a low level of positive responses in both institutions – 36% and 46%, respectively, and only 25% of the total number of respondents. Medical treatment was sought by 51% of medical students, which logically can be explained by awareness of the issue, although the percentage of those treated is small. However, only 17% of pedagogical students received medical treatment for their condition. Doctors should therefore provide information about the symptoms of post-COVID-19 and the possibilities of medical, physiotherapeutic and psychological support. The research revealed an interesting fact about the physical activity of the students. Among those who fell ill in both institutions, 38.37% of the pedagogical students and 61% of the medical students reported being physically active in the post-epidemic period, while 8.5% and

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2.5% respectively were not physically active. Significantly lower levels of physical activity correlate with higher levels of post-COVID-19 in medical graduates.

How do you recover quickly from SARS-CoV-2? There are currently no instructions or recipes for a quick recovery. This is especially true given the variable course of the disease and the individual characteristics of each patient.

Post-COVID-19 syndrome is a complex, multisyndromic problem, so a team of specialists should work with the patient. Individual rehabilitation should begin with a consultation with a therapist who should assess physical, cognitive, psychological and psychiatric symptoms and functional abilities. It is important to consider the impact of post-COVID-19 syndrome on a person's work, education, mood and social relationships.

If necessary, the doctor refers the patient to narrow specialists: neurologist, pulmonologist or cardiologist. An important specialist in this area is a physiotherapist, who can help to manage fatigue, improve mobility and teach breathing exercises. It is also important not to overlook depression, anxiety and insomnia. A psychologist or psychotherapist must therefore be part of the rehabilitation team.

Current evidence suggests that physical activity [18], adequate sleep quality and regular sleep patterns [19] are associated with a reduced likelihood of future hospitalisation or death from SARS-CoV-2. This may be due to the reduction of chronic inflammation [20; 21] and cardiometabolic risk factors [22], and the strengthening of the immune system [23].

The entire network of health care institutions in Ukraine is ready to provide the necessary counselling, examination and treatment of patients with post-COVID-19 syndrome both in outpatient clinics and, if necessary, in hospitals within the framework of the Medical Guarantee Program, taking into account the recommendations specially developed by experts of the Ministry of Health and the approved protocol treatment (Order of the Ministry of Health of Ukraine on April 20, 2021 No.771, Protocol on the provision of rehabilitation assistance to patients with coronavirus disease (SARS-CoV-2) and convalescent women).

The analysis of the results of the conducted research highlights the expediency of providing recommendations to those seeking higher education. Students who experience PCS symptoms, namely weakness, increased fatigue, reduced work capacity, sleep disturbance and mood instability, need to review the organisation of the educational process in the conditions of distance learning. Make changes to your lifestyle: get a full eight hours' sleep a night and stick to your sleep schedule, get enough exercise, and take more breaks during the day after practical classes and lectures. When studying or doing homework, take 10–20 minute breaks, do exercises to relieve the eyes, cervical spine, lower back, shoulder and carpal joints. Walk in the fresh air for at least 2 hours a day, do active recreation 2 times a week. If PCS is accompanied by a disturbance of mental functions ("brain fog", weakening of attention, memory, thinking), cognitive rehabilitation is indicated. Its programme includes a system of specially organised classes aimed at eliminating cognitive dysfunctions with the help of a neuropsychologist and a clinical psychologist.

Psychological rehabilitation is needed for people suffering from negative mental states (increased anxiety, apathy, sleep disturbances, constant fatigue, fears, depressive moods, suicidal thoughts, aggressiveness) caused not only by the SARS-CoV-2 virus, but also by the general consequences of the pandemic, which have affected all areas of life. Psychological rehabilitation is aimed at eliminating the emotional exhaustion that has developed over many months as a result of a series of restrictions, trials

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and suffering caused by the SARS-CoV-2 pandemic and is carried out by a qualified psychologist-consultant, psychologist-psychotherapist. For cognitive rehabilitation, training in attention, memory and thinking development is effective, for stabilising psycho-emotional states, namely group and individual psychotherapy, psychological counselling.

Psychotherapeutic interventions are corrective work aimed at resolving emotional, behavioural and interpersonal problems.

The student's working capacity, as well as the effectiveness of material perception, attention, memory and thinking increases significantly under the conditions of a variety of control methods. Therefore, it is important not only to plan the educational process, but also to use various forms of knowledge quality control, which should move in the direction of maximum individualization and diversity. Nevertheless, distance learning has great prospects, because it is justified and really convenient. This type of training has a leading role in the future, is innovative and needs further improvement in terms of clinical expertise.

Conclusions

1. Despite the young age and mostly mild course of the coronavirus disease, the incidence rate among university students is 86%, the diagnosis was mainly made by the PCR method. 94% of respondents had signs of post-SARS-CoV-2 syndrome for one of the symptoms, more than 50% for two or more symptoms.

2. A reliably high proportion of respondents from both universities suffer from damage to the nervous system and the simultaneous onset of a combination of symptoms, such as headaches, memory problems, insomnia, anxiety, unmotivated weakness or excessive fatigue, is alarmingly high among respondents from both universities. and requires the development of further treatment and diagnostic programs.

3. The above-mentioned complaints and the need, after the illness, to increase the time to complete the educational task, the deterioration of memory and sleep disturbances or difficulties in falling asleep, indicate that the educational performance, psychological state and psychosomatic background of the students are at a low level and that there is a need to develop recommendations for the cognitive rehabilitation of this category of students, taking into account their significant educational load (the samples were made up of final year students).

4. The low and moderate physical activity of university students in their senior years may be the trigger that increases the symptoms of post-COVID-19 syndrome and requires the development of recommendations for the physical rehabilitation of this category of patients.

Conflict of interest is absent.

Література

1. Scalabrini A, Palladini M, Mazza MG, Mucci C, Northoff G, Benedetti F. In Between the Psychological and Physiological Self - The Impact of COVID-19 Pandemic on the Neuro-Socio-Ecological and Inflammatory Mind-Body-Brain System. Clin Neuropsychiatry. 2023; 20(4):342-350. DOI: 10.36131/cnfioritieditore20230414. PMID: 37791086.

2. Deabler A. Interactive coronavirus heat map shows spread of virus around the globe. Fox News, 24 Jan 2020. [Internet]. Available at: https://www.foxnews.com/health/coronavirus-heat-map-johns-hopkins-university [accessed 20 Mar 2024].

3. Premraj L, Kannapadi NV, Briggs J, Seal SM, Battaglini D, Fanning J, Mid and long-term neurological and neuropsychiatric manifestations of post-COVID-19 syndrome: A meta-analysis. J Neurol Sci. 2022;434:120162. DOI: 10.1016/j.jns.2022.120162. PMID: 35121209.

ISSN print 2414-4495, ISSN online 2710-1444, https://msz.knmu.edu.ua, msz.journal@knmu.edu.ua

4. Aghajani Mir M. Brain Fog: a Narrative Review of the Most Common Mysterious Cognitive Disorder in COVID-19. Mol Neurobiol. 24 Oct 2023. DOI: 10.1007/s12035-023-03715-y. PMID: 37874482.

5. Lippi G, Sanchis-Gomar F, Henry BM. COVID-19 and its long-term sequelae: what do we know in 2023? Pol Arch Intern Med. 2023;133(4):16402. DOI: 10.20452/pamw.16402. PMID: 36626183.

6. Karatash AV, Bilanova LP, Bilash SM, Pronina OM, Bilash VP, Hryn KV, et al. Progress and problems of vaccination against coronarovirus infection COVID-19. Bulletin of problems biology and medicine. 2022;3(166):50-7. DOI 10.29254/2077-4214-2022-3-166-50-58.

7. Yarmola T, Tkachenko L, Pustovoyt H, Rustamian S, Talash V, Kostrikova Iu, et al. Hemodialysis versus peritoneal dialysis in COVID-19 clinical characteristics and outcomes: A single-center experience. Ukr J of Nephr and Dialysis. 2023;1(77):40-8. DOI: 10.31450/ukrjnd.1(77).2023.06. [In Ukrainian].

8. Bodnar VA, Koval TI, Kotelevska TM, Marchenko OG, Pryimenko NO, Syzova LM, Izyumska OM. Clinical characteristics of patients with severe and critical during the course of COVID-19. Bulletin of problems biology and medicine. 2023;3(170):39-52. DOI: 10.29254/2077-4214-2023-3-170-184-194.

9. Huxol H, Yaddanapudi K, Bushau-Sprinkle A, Palmer K, Bickel S, Morton R, Harris C. COVID-19 Disease in Children with Medical Complexity in a Pediatric Long-term Care Facility: A Case Series. Pediatr Infect Dis J. 2022;41(9):e403-5. PMID: 35622420. DOI: 10.1097/INF.0000000000003587.

10. Cox D. What do we know about COVID-19 and children? BMJ. 2023;380:21. DOI: 10.1136/bmj.p21.

11. Pellegrino R, Chiappini E, Licari A, Galli L, Marseglia GL. Prevalence and clinical presentation of long COVID in children: a systematic review. Eur J Pediatr. 2022;181(12):3995-4009. DOI: 10.1007/s00431-022-04600-x. PMID: 36107254.

12. Lopez-Leon S, Wegman-Ostrosky T, Perelman C, Sepulveda R, Rebolledo PA, Cuapio A, Villapol S. More than 50 Long-term effects of COVID-19: a systematic review and meta-analysis. medRxiv [Preprint]. 2021:2021.01.27.21250617. DOI: 10.1101/2021.01.27.21250617. Update in: Sci Rep. 2021;11(1):16144. PMID: 33532785.

13. Fernandez-de-Las-Penas C, Rodriguez-Jimenez J, Cancela-Cilleruelo I, Guerrero-Peral A, Martin-Guerrero JD, Garcia-Azorin D, et al. Post-COVID-19 Symptoms 2 Years After SARS-CoV-2 Infection Among Hospitalized vs Nonhospitalized Patients. JAMA Netw Open. 2022;5(11):e2242106. DOI: 10.1001/jamanetworkopen.2022.42106. PMID: 36378309.

14. Ceban F, Ling S, Lui LMW, Lee Y, Gill H, Teopiz KM, et al. Fatigue and cognitive impairment in Post-COVID-19 Syndrome: A systematic review and meta-analysis. Brain Behav Immun. 2022;101:93-135. DOI: 10.1016/j.bbi.2021.12.020. PMID: 34973396.

15. Graham EL, Clark JR, Orban ZS, Lim PH, Szymanski AL, Taylor C, et al. Persistent neurologic symptoms and cognitive dysfunction in non-hospitalized COVID-19 "long haulers". Ann Clin Transl Neurol. 2021;8(5):1073-85. DOI: 10.1002/acn3.51350. PMID: 33755344.

16. Ali ST, Kang AK, Patel TR, Clark JR, Perez-Giraldo GS, Orban ZS, et al. Evolution of neurologic symptoms in non-hospitalized COVID-19 "long haulers". Ann Clin Transl Neurol. 2022;9(7):950-61. DOI: 10.1002/acn3.51570. PMID: 35607826.

17. Alkodaymi MS, Omrani OA, Fawzy NA, Shaar BA, Almamlouk R, Riaz M, et al. Prevalence of post-acute COVID-19 syndrome symptoms at different follow-up periods: a systematic review and meta-analysis. Clin Microbiol Infect. 2022;28(5):657-66. DOI: 10.1016/j.cmi.2022.01.014. PMID: 35124265.

ISSN print 2414-4495, ISSN online 2710-1444, https://msz.knmu.edu.ua, msz.journal@knmu.edu.ua

18. Sallis R, Young DR, Tartof SY, Sallis JF, Sall J, Li Q, et al. Physical inactivity is associated with a higher risk for severe COVID-19 outcomes: a study in 48 440 adult patients. Br J Sports Med. 2021;55(19):1099-105. DOI: 10.1136/bjsports-2021-104080. PMID: 33849909.

19. Rowlands AV, Dempsey PC, Gillies C, Kloecker DE, Razieh C, Chudasama Y, et al. Association Between Accelerometer-Assessed Physical Activity and Severity of COVID-19 in UK Biobank. Mayo Clin Proc Innov Qual Outcomes. 2021;5(6):997-1007. DOI: 10.1016/j.mayocpiqo.2021.08.011. PMID: 34430796.

20. Sallis JF, Adlakha D, Oyeyemi A, Salvo D. An international physical activity and public health research agenda to inform coronavirus disease-2019 policies and practices. J Sport Health Sci. 2020;9(4):328-34. DOI: 10.1016/j.jshs.2020.05.005. PMID: 32450160.

21. Warburton DE, Nicol CW, Bredin SS. Health benefits of physical activity: the evidence. CMAJ. 2006;174(6):801-9. DOI: 10.1503/cmaj.051351. PMID: 16534088.

22. Yang J, Zheng Y, Gou X, Pu K, Chen Z, Guo Q, et al. Prevalence of comorbidities and its effects in patients infected with SARS-CoV-2: a systematic review and meta-analysis. Int J Infect Dis. 2020;94:91-5. DOI: 10.1016/j.ijid.2020.03.017. PMID: 32173574.

23. Chastin SFM, Abaraogu U, Bourgois JG, Dall PM, Darnborough J, Duncan E, et al. Effects of Regular Physical Activity on the Immune System, Vaccination and Risk of Community-Acquired Infectious Disease in the General Population: Systematic Review and Meta-Analysis. Sports Med. 2021;51(8):1673-86. DOI: 10.1007/s40279-021-01466-1. PMID: 33877614.

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УРОКИ ГЛОБАЛЬНОЇ ПАНДЕМІЇ COVID-19 У ЗВ'ЯЗКУ З ЯКІСТЮ НАВЧАННЯ

Нещодавня глобальна пандемія коронавірусної інфекції має значні медико-соціальні наслідки. Неврологічні та психологічні порушення людей, що перехворіли на COVID-19, погіршують результати навчання здобувачів вищої освіти. Метою роботи було провести порівняння розповсюдженості та оцінити симптоми постковідного синдрому за літературними даними та виявити його вплив на якість навчання за результатами анкетування здобувачів вищої освіти старших курсів. Опитані 200 здобувачів освіти: по 100 з Полтавського державного медичного університету та Полтавського національного педагогічного університету ім. В.Г. Короленка. Ознаками впливу хвороби на нервову систему були: головний біль, погіршення пам'яті, інсомнія, тривожність, немотивована слабкість, надмірна втомлюваність. Після перенесеного захворювання здобувачі освіти відзначали збільшення часу на виконання навчальних завдань, погіршення пам'яті, порушення сну та важке засинання. Зроблено висновок, що низька та помірна фізична активність здобувачів освіти може бути тригером посилення симптомів постковідного синдрому. Надані рекомендації щодо реабілітації та зміни способу життя задля покращення якості навчального процесу.

Ключові слова: *здобувачі вищої освіти, постковідний синдром, тривалий COVID-19, синдром далекобійника.*

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