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Original Research Article

Prevalence of post COVID-19 syndrome

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ABSTRACT

Background: Post COVID-19 syndrome is a condition where symptoms from the acute infection continue to persist after several weeks of testing negative on RT-PCR. It has been divided into 2 stages- post-acute and post chronic COVID-19, where symptoms continue to persist after 3 and 12 weeks respectively. The most common are fatigue, breathlessness, arthralgia, myalgia, chest pain, headache, concentration problems, etc. Different treatment techniques like breathing exercises, strengthening and stretching as well as cardiovascular endurance exercises can be given to improve their quality of life.
Methods: A cross-sectional study was conducted among 150 COVID-19 survivors who are in the time-span of more than 3 weeks after testing negative on RT-PCR. A validated questionnaire was circulated via online platforms. The data was analysed using descriptive statistics.
Results: Data analysis showed that there was a 39.33% prevalence of post COVID-19 syndrome among the Indian population. The standard deviation of age was 33.96±13.954. It is found that high levels of fatigue (28.2%), myalgia (12.9%), cough (10.3%), headache (7.7%) and breathlessness (7.7%) still exist post 3 weeks of COVID-19 infection. In the case of post 12 weeks of COVID-19 infection, symptoms like fatigue (19%), avascular necrosis of femur (AVN) (12.6%), arthralgia (10.8%), myalgia (9%), problems with concentration (9%) and brain fog (7.2%) still persist.
Conclusions: The study confirms the occurrence of long-term COVID-19 effects in the Indian population, and a 39.33% prevalence of post COVID-19 syndrome.

Keywords: Corona-virus, COVID-19, Fatigue, Indian, Myalgia, Post COVID-19 syndrome

INTRODUCTION

Corona-virus disease 2019 (COVID-19) is caused due to SARS-CoV-2 and has been declared as a global pandemic by the World Health Organization in March 2020. COVID-19 has caused major havoc all over the world and has resulted in creating a great deal of morbidity and mortality. The pathophysiology of the disease has been studied to affect the pulmonary system when the respiratory droplets infected by the virus come in close contact with an individual. Symptoms of the acute infection include fever, dyspnea, productive or non-productive cough, weakness, and muscle pain. These can be noticed anytime between a period of 5-11 days after one's exposure to the virus. Reverse transcriptase-polymerase chain reaction (RT-PCR) testing has been used for the diagnosis of the disease.[1]

COVID-19 can affect individuals of all ages but is more commonly seen in older people, with co-morbidities. People with mild symptoms can stay under home isolation but some with moderate to severe infection require hospitalization, oxygen supplementation, mechanical ventilation, and medications like remdesivir, corticosteroids, tocilizumab, etc.[2]

Research about acute infection is ongoing but very little is known about the long-term consequences. Long-term effects were noted during severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS) which were caused by a similar virus and thus the need to study the long-term sequelae of COVID-19 has to be considered.[3-6] Long-COVID-19 or post-COVID-19 syndrome (also called as Long-Haulers) has been described as a condition where symptoms from the acute infection continue to persist even after weeks and there is no other diagnosis or explanation. It's been divided into 2 stages- post-acute COVID-19 and post chronic COVID-19, if the symptoms persist for more than 3 and 12 weeks respectively. The cause for this condition is still under question as to whether it is due to the virus weakening the immune system and affecting recovery and causing repeated inflammations or recurrent infections or side effects of the drugs or could be similar to any lasting effects seen in viral diseases like dengue, malaria, or chikungunya.[7-9] The commonest symptoms found to exist even after testing negative on RT-PCR are fatigue, dyspnea, cough, sore throat, myalgia, arthralgia, headache, concentration problems, anxiety, palpitations, chest pain, hair loss, loss of smell, loss of taste, diarrhea.[10,11]

Physical activity, exercise capacity, and quality of life have also been found to be affected significantly.[12-16] According to research a definite treatment for the syndrome in question has not been sought, however, a multidisciplinary approach with physiotherapy as an important part of it has been suggested along with occupational, psychosocial, and cognitive therapy.[17,18]

Long-term consequences have been studied in different countries affected by the corona-virus like The United States of America, Mexico, the United Kingdom, Italy, and China.[7,8,10,11]

This study helps to find the prevalence of post-COVID-19 syndrome in Pune city, as it is one of the major cities to be dramatically affected by the virus in India. Additionally, it will aid in understanding whether co-morbidities, hospital and ICU stays, supplemental oxygen, and other treatments raise the likelihood of experiencing prolonged symptoms.

METHODS

Participants

150 participants were recruited by simple random sampling technique in this cross-sectional observational study between the months of December 2021 and April 2022. All genders residing in Pune city between the age group of 18-70 who have tested positive for COVID-19 on RT-PCR and are in the time-span of more than 3 weeks after testing negative on RT-PCR were included in the study. One of the requirements for inclusion was that the participant be able to understand and speak English. Individuals diagnosed with fibromyalgia, rheumatoid arthritis, systemic lupus erythematosus, hypothyroidism, any type of cancer were excluded from the study.

Procedure

Approval to conduct the study was taken from the Institutional Ethical Committee (IEC). Subjects fitting the inclusion criteria were recruited with their consent. A self-made validated questionnaire was sent via WhatsApp and other social media platforms and to the patients visiting the physiotherapy department at Sancheti Institute of Orthopedics and Rehabilitation. The questionnaire included questions about co-morbidities, COVID-19 symptoms after testing positive, if any hospital or ICU stay, if any oxygen supplementation was required, any medications prescribed, duration since testing negative and what all symptoms persist even after 3 weeks to months.

Data analysis

The collected data was analyzed using descriptive statistics.

RESULTS

Among 150 COVID-19 survivors, data analysis revealed a prevalence of 39.33% for post COVID-19 syndrome, where at least one symptom is still present even after 3 weeks after testing negative on RT-PCR (Figure 1).

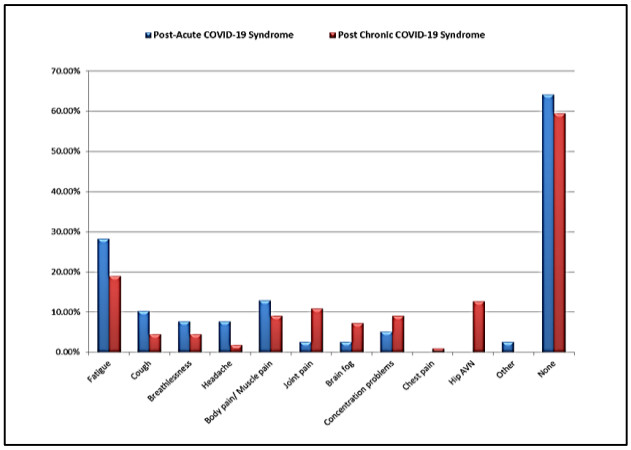

Figure 1: Distribution of symptoms in post-acute and post-chronic COVID-19 syndrome.

Table 1: Percentage of males and females included in the study.

	Males	Females
Percentage	48%	52%

The standard deviation of age was 33.96±13.954 and the percentage of males and females was 48% and 52% respectively (Table 1).

Table 2: Percentage of participants requiring ICU stay during acute COVID-19 infection.

	Yes	No
ICU admission	2%	98%

Table 3: Percentage of participants requiring supplemental oxygen as a part of treatment during COVID-19 infection.

	Yes	No
Supplemental oxygen	8.66%	91.33%

The study included hospitalized as well as non-hospitalized patients with 2% requiring ICU admission and 8.66% requiring supplemental oxygen during the acute infection (Tables 2 and 3).

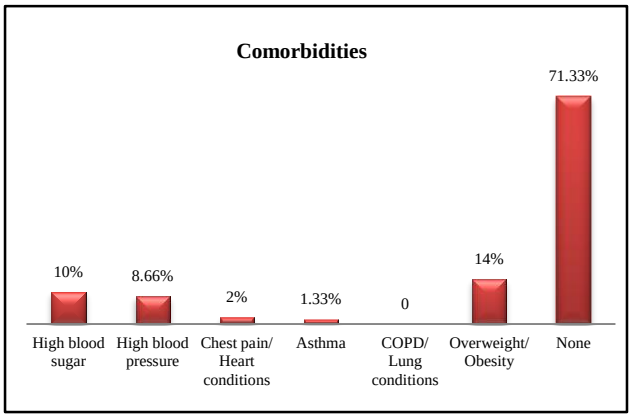

Figure 2: Co-morbidities suffered from the participants.

The patients suffering from various co-morbidities like diabetes mellitus (10%), hypertension (8.66%), asthma (1.33%), any chest pain/heart or lung conditions (2%), and obesity (14%) were included in the study (Figure 2). The most common co-morbidities in this population group were found to be obesity and diabetes mellitus, which increased their susceptibility to COVID-19's long-term effects.

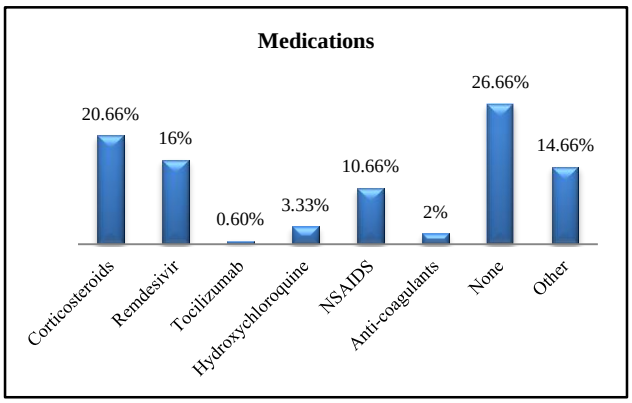

Figure 3: Medications prescribed during acute COVID-19 infection.

Amongst the participants, corticosteroids (20.66%) was the most commonly prescribed medication, followed by remdesivir (16%), non-steroidal anti-inflammatory drugs (NSAIDS) (10.66%), hydroxychloroquine (3.33%), anti-coagulants (2%), tocilizumab (0.60%) and others (14.66%) (Figure 3). These medications were prescribed in order to deal with the symptoms present during the acute period of COVID-19 which were as follows- fever, fatigue, sore throat, cough, dyspnea, loss of smell, loss of taste, headache, myalgia, arthralgia, etc.

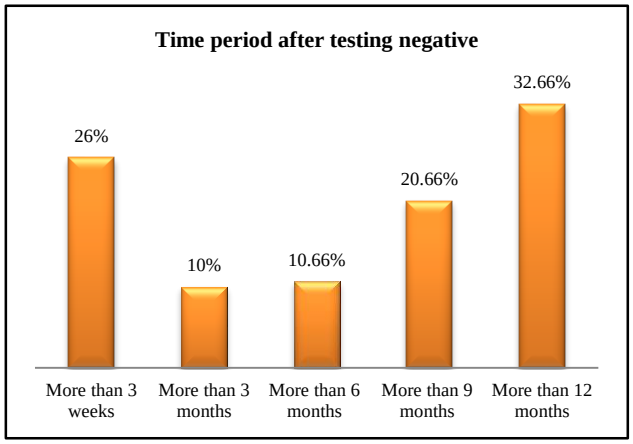

Figure 4: Percentage of participants in post acute and post chronic phase.

Out of the 150 participants, 26% of the population was in the post-acute period, i.e. suffering from symptoms of COVID-19 even after 3 weeks of testing negative, whereas 74% were in the post chronic phase i.e. showing symptoms even after 12 weeks of testing negative on RT-PCR (Figure 4).

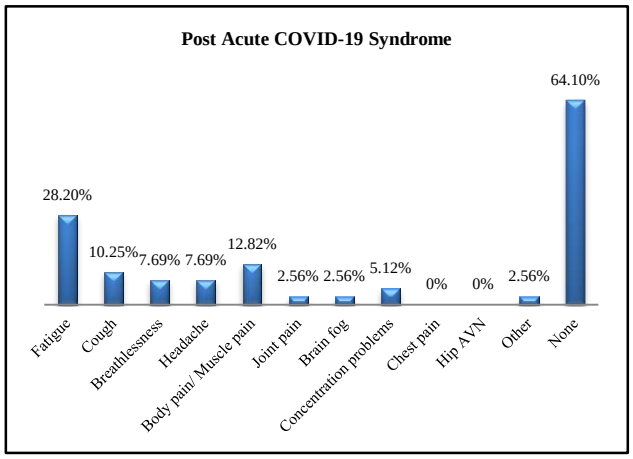

Figure 5: Percentage of symptoms still persistent post 3 weeks of COVID-19 infection.

It was found that high levels of fatigue (28.2%), myalgia (12.82%), cough (10.25%), headache (7.7%) and breathlessness (7.7%), concentration problems (5.12%), arthralgia and brain fog (2.56%) still exist post 3 weeks of COVID-19 infection (Figure 5).

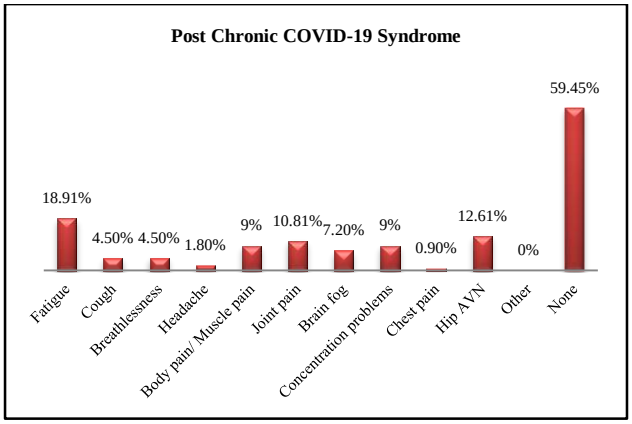

Figure 6: Percentage of symptoms still persistent post 12 weeks of COVID-19 infection.

In the case of post 12 weeks of COVID-19 infection, most common symptoms in the study population were fatigue (18.91%), avascular necrosis of femur (AVN) (12.6%), arthralgia (10.8%), myalgia (9%), problems with concentration (9%) and brain fog (7.2%) which still persist (Figure 6).

DISCUSSION

This cross-sectional study was conducted with the aim to find the prevalence of post COVID-19 syndrome in the Indian population residing in Pune city. There was 39.33% prevalence of post COVID-19 syndrome. According to the data analysis, individuals still suffered from symptoms of COVID-19 after 3 and 12 weeks of testing negative on RT-PCR. In both, post-acute as well as post chronic stages of post COVID-19 syndrome, self-reported fatigue was found to be the most common debilitating symptom, followed by myalgia, arthralgia, cough, dyspnea, and avascular necrosis of hip, concentration problems, brain fog and headache. This research contributes to a better understanding of the length and the number of symptoms associated with post COVID-19 syndrome. Even after 3 to 12 months of the acute corona-virus infection, at least one symptom persisted in the study samples. The findings corroborate the idea that patients with risk factors such as advanced age, pre-existing co-morbidities, ICU admission, supplementary oxygen, and drugs provided are more likely to develop post COVID-19 syndrome, which is one of the study's objectives. The pathology's specific mechanism is unknown; however it could be linked to recurring inflammations or infections, or the virus weakening the immune system.[3,4]

The computed data of this study indicate a high frequency of fatigue following an acute infection. Although it was reported to be higher in the post-acute phase (28.2%) and was decreased to 19% in the post chronic phase. This study's findings coincide with the one done in the population group of Wuhan, China. It was investigated by Huang et al that even after 6 months symptoms like fatigue or muscle weakness (63%) and sleep difficulties (26%) were common. Exercise capacity using the 6-minute walk test was also found to be reduced which can be due to fatigue.[6] Additionally a systematic review and meta-analysis was done in 2022 by Ceban et al, which identified the prevalence of fatigue and cognitive impairments post 12 weeks following a confirmed diagnosis of COVID-19 in hospitalized as well as non-hospitalized individuals.[19] Female sex, older age, greater severity of acute illness, and pre-existing co-morbidities were all frequently reported characteristics linked with a higher incidence of post COVID-19 syndrome symptoms. Also, a cohort study conducted in the United States of America, which supports the findings of the current study. Only 22.9% of patients were completely symptom-free even 12 months after the acute infection, with the most common symptoms being decreased exercise capacity (56.3%), fatigue (53.1%), dyspnea (37.5%), and difficulties with concentration (39.6%), finding words (32.3%), and sleeping (26.0%).[21] Similar results were documented in COVID-19 patients discharged from the hospital in Italian research conducted by Carfi et al, with a mean follow-up of 60 days following symptom onset. Fatigue (53.1%) and dyspnea (43.4%) were the most commonly reported symptoms, and 44.1% of patients in this study reported deterioration in quality of life, as judged by the EuroQol visual analogue scale.[22] According to an observational study done in Northern India by Naik et al, repeated inflammation, vitamin D deficiencies, anemia, reduced firing of the motor neuron units can all contribute to long lasting fatigue. Psychological factors also have to be considered.[26] The majority of those who took part in the study had a mild to moderate infection. Thus when comparing the findings of this study to the current literature, it should be noted that just 2% of the 150 participants required ICU admission, and only 9% required supplemental oxygen.

Avascular necrosis of the femoral head is a unique finding in this research, according to the analysis followed by COVID-19 infection. It is attributed to the use of steroids as a part of medical management for corona-virus. In this study, its prevalence after three months of COVID-19 infection was 12.61%. Corticosteroids (22%) were the most commonly prescribed medication in this study population as well. Agarwala et al, wrote a case report that suggested a similar conclusion. However, early AVN (mean of 58 days) was observed in all three cases mentioned in the report, despite literature stating that AVN develops 6 months to a year after steroid administration.[27]

Myalgia continues after COVID-19 infection, according to our descriptive statistics, and its influence must be evaluated. It is 12.9% in the post-acute period, and it drops to 9% in the chronic phase. Arthralgia increased from 2.56% to 10.8% after three months of COVID-19 infection. These findings are in line with prior investigations such as an Italian research conducted in

2020 also stated arthralgia (27.3%) amongst the most common symptoms to be present even after 60 days of infection.[22] Similarly, an observation study done in Delhi, India by Naik et al, found that the most common symptoms post 4 months of COVID-19 infection included myalgia (10.9%), fatigue (5.5%), shortness of breath (6.1%), cough (2.1%), insomnia (1.4%), mood disturbances (0.48%) and anxiety (0.6%).[26] Autoimmune reactions, chronic and recurrent inflammation, lymphopenia, long-term tissue and organ damage, and a persistent viral load in the body can all contribute to it.[28]

The most prevalent respiratory complications after a mild to moderate COVID-19 infection are cough and dyspnea.[4,5,21,22,26,28,29] Cough and dyspnea were reported by 10.3% and 7.7% of participants in the acute phase, respectively, although the prevalence drops to 4.5% in the chronic phase. In a systematic review and meta-analysis done by Fernández-de-Las-Peñas et al, it also suggests that cough and dyspnea are amongst the most common symptom to be present even after 30, 60 and 90 days post home quarantine and hospitalization.[29] The rationale for the persistence in these symptoms can be the inflammatory damage to the pulmonary system causing parenchymal injury by the virus, fibrosis, or underlying respiratory condition affecting the interstitium.[26,28]

There is enough data to show that personalized and supervised exercise training could be an effective multi-systemic therapy for post-COVID-19 syndrome that is tailored to the individual cases and symptoms. More research on the effects of exercise-based treatments for post-COVID-19 syndrome is needed to provide practical insights into the best sort of exercise to prescribe, with an emphasis on intensity and load management, as well as adherence techniques.[24]

Further scope of the study

In the future, the study could make use of a larger sample size to better determine how it relates to the patients' quality of life after contracting post-COVID-19 infection. To widen the coverage of the study in various urban and rural parts of the city, the questionnaire can be created in a variety of languages.

Clinical implication

This study helps us in understanding the various physical and mental symptoms patients undergo post COVID-19 infection and how further assessment of this population is of utmost importance and giving them customized treatment protocol to improve their daily functioning and quality of life.

CONCLUSION

The study concludes the occurrence of long-term COVID-19 effects in the Indian population, including fatigue, myalgia, arthralgia, cough, dyspnea, problems with concentration and attention, and femoral avascular necrosis, as well as presence of post COVID-19 syndrome. Patients with a moderate to severe corona-virus infection who require hospitalization, supplemental oxygen, several medications, or who have multiple co-morbidities are more likely to experience the above-mentioned long-term effects, according to the study.

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REFERENCES

1. Wiersinga WJ, Rhodes A, Cheng AC, Peacock SJ, Prescott HC. Pathophysiology, transmission, diagnosis, and treatment of corona virus disease 2019 (COVID-19): a review. JAMA. 2020;324(8):782-93.
2. Ng TSB, Leblanc K, Yeung DF, Tsang TSM. Medication use during COVID-19: Review of recent evidence. Can Fam Phys. 2021;67(3):171-9.
3. Yelin D, Wirtheim E, Vetter P, Kalil AC, Bruchfeld J, Runold M, et al. Long-term consequences of COVID-19: research needs. Lancet Infect Dis. 2020;20(10):1115-7.
4. Raveendran AV, Jayadevan R, Sashidharan S. Long COVID: an overview. Diabetes Metab Syndr Clin Res Rev. 2021;15(3):869-75.
5. Kabi A, Mohanty A, Mohanty AP, Kumar S. Post COVID-19 syndrome: a literature review. J Adv Med Med Res. 2020;32(24):289-95.
6. Van den Borst B, Peters JB, Brink M, Schoon Y, Bleeker-Rovers CP, Schers H, et al. Comprehensive health assessment 3 months after recovery from acute coronavirus disease 2019 (COVID-19). Clin Infect Dis. 2021;73(5):e1089-98.
7. Huang C, Huang L, Wang Y, Li X, Ren L, Gu X, et al. 6-month consequences of COVID-19 in patients discharged from hospital: a cohort study. Lancet. 2021;397(10270):220-32.
8. Navarro AO, Cervantes-Bojalil J, Quevedo OD, Martínez AA, Hernández-Jiménez CA, Álvarez EP, et al. Decreased quality of life and spirometric alterations even after mild-moderate COVID-19. Respir Med. 202;181:106391.
9. Goërtz YM, Van Herck M, Delbressine JM, Vaes AW, Meys R, Machado FV, et al. Persistent symptoms 3 months after a SARS-CoV-2 infection:

the post-COVID-19 syndrome? ERJ Open Res. 2020;6(4).
10. Halpin SJ, McIvor C, Whyatt G, Adams A, Harvey O, McLean L, et al. Postdischarge symptoms and rehabilitation needs in survivors of COVID-19 infection: a cross-sectional evaluation. J Med Virol. 2021;93(2):1013-22.
11. Sykes DL, Holdsworth L, Jawad N, Gunasekera P, Morice AH, Crooks MG. Post-COVID-19 symptom burden: what is long-covid and how should we manage it? Lung. 2021;199(2):113-9.
12. Kamal M, Abo Omirah M, Hussein A, Saeed H. Assessment and characterization of post-COVID-19 manifestations. Int J Clin Pract. 2021;75(3):e13746.
13. Galal I, Hussein AA, Amin MT, Saad MM, Zayan HE, Abdelsayed MZ, et al. Determinants of persistent post-COVID-19 symptoms: value of a novel COVID-19 symptom score. Egypt J Bronchol. 2021;15(1):1-8.
14. Cipollaro L, Giordano L, Padulo J, Oliva F, Maffulli N. Musculoskeletal symptoms in SARS-CoV-2 (COVID-19) patients. J Orthop Surg Res. 2020;15(1):178.
15. Abdullahi A, Candan SA, Abba MA, Bello AH, Alshehri MA, Afamefuna Victor E, et al. Neurological and musculoskeletal features of COVID-19: a systematic review and meta-analysis. Front Neurol. 2020;11:687.
16. Mayer KP, Steele AK, Soper MK, Branton JD, Lusby ML, Kalema AG, et al. Physical therapy management of an individual with post-COVID syndrome: a case report. Phys Ther. 2021;101(6):pzab098.
17. Taboada M, Moreno E, Cariñena A, Rey T, Pita-Romero R, Leal S, et al. Quality of life, functional status, and persistent symptoms after intensive care of COVID-19 patients. Br J Anaesth. 2021;126(3):e110-3.
18. Halpin S, O'Connor R, Sivan M. Long COVID and chronic COVID syndromes. J Med Virol. 2021;93(3):1242-3.
19. Ceban F, Ling S, Lui LM, 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.
20. Delbressine JM, Machado FV, Goërtz YM, Van Herck M, Meys R, Houben-Wilke S, et al. The impact of post-COVID-19 syndrome on self-reported physical activity. Int J Environ Res Public Health. 2021;18(11):6017.
21. Seeßle J, Waterboer T, Hippchen T, Simon J, Kirchner M, Lim A, et al. Persistent symptoms in adult patients 1 year after coronavirus disease 2019 (COVID-19): a prospective cohort study. Clin Infect Dis. 2022;74(7):1191-8.
22. Carfì A, Bernabei R, Landi F. Gemelli against COVID-19 post-acute care study group. Persistent symptoms in patients after acute COVID-19. JAMA. 2020;324(6):603-5.
23. Arnold DT, Hamilton FW, Milne A, Morley AJ, Viner J, Attwood M, et al. Patient outcomes after hospitalisation with COVID-19 and implications for follow-up: results from a prospective UK cohort. Thorax. 2021;76(4):399-401.
24. Jimeno-Almazán A, Pallarés JG, Buendía-Romero Á, Martínez-Cava A, Franco-López F, Sánchez-Alcaraz Martínez BJ, et al. Post-COVID-19 syndrome and the potential benefits of exercise. Int J Environ Res Public Health. 2021;18(10):5329.
25. Sathyamurthy P, Madhavan S, Pandurangan V. Prevalence, pattern and functional outcome of post COVID-19 syndrome in older adults. Cureus. 2021;13(8).
26. Naik S, Haldar SN, Soneja M, Mundadan NG, Garg P, Mittal A, Desai D, Trilangi PK, Chakraborty S, Begam NN, Bhattacharya B. Post COVID-19 sequelae: a prospective observational study from Northern India. Drug Discov Ther. 2021;15(5):254-60.
27. Agarwala SR, Vijayvargiya M, Pandey P. Avascular necrosis as a part of 'long COVID-19'. BMJ Case Rep. 2021;14(7):e242101.
28. Yong SJ. Long COVID or post-COVID-19 syndrome: putative pathophysiology, risk factors, and treatments. Infect Dis (Lond). 2021;53(10):737-54.
29. Fernández-de-Las-Peñas C, Palacios-Ceña D, Gómez-Mayordomo V, Florencio LL, Cuadrado ML, Plaza-Manzano G, et al. Prevalence of post-COVID-19 symptoms in hospitalized and non-hospitalized COVID-19 survivors: a systematic review and meta-analysis. Eur J Intern Med. 2021;92:55-70.

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