

Patterns of Post-COVID Symptoms among Recovered Patients Attending Follow-Up Clinics, A Cross-sectional analysis

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Abstract

Background: Post-COVID syndrome is a serious public health problem that is caused by persisting symptoms after the acute phase of SARS-CoV-2 infection. The study aimed to evaluate the symptom pattern of recovered patients in follow-up clinics and to classify factors related with the burden of symptoms. **Methods:** A cross-sectional study (n=150) used non-probability technique to gather data on socio-demographic characteristics, clinical history during persistent symptoms of COVID and acute COVID infection. SPSS version 26.0, data analysis was carried out. Descriptive statistics, chi-squared tests, multiple regression analysis and Pearson's correlation were performed to identify associations between variables (p-value < 0.05). **Results:** COPD symptoms were present in 71.3% of patients and the most repeated symptoms were fatigue (54.7%), dyspnea (42.7%) and sleep disturbance (38.7%). Patients with severe acute infection, ICU admission, hospitalization, oxygen therapy and significantly had more symptoms burden (p < 0.001). The acute disease severity positively and significantly correlated with number of post-COVID symptoms (r = 0.41, p<0.001). Severe acute infection ($\beta = 0.36$, p < 0.001), intensive care unit (ICU) admission ($\beta = 0.29$, p = 0.002), and oxygen therapy ($\beta = 0.24$, p = 0.006) were found to be significant factors in predicting a higher symptom burden. The model explained 52% of the variance in the post-COVID symptom burden ($R^2 = 0.52$). **Conclusions:** COVID-19 patients who have recovered are still suffering from symptoms, such as fatigue and respiratory issues. Acute infection severity is a good predictor of long-term symptom burden.

Keywords: Post-COVID syndrome, long COVID, symptom burden, COVID-19 recovery, follow-up clinics.

Introduction

The SARS-CoV-2 virus, the cause of coronavirus disease (COVID-19), has generated a worldwide health crisis that has severe morbidity and mortality consequences ¹. Since emerging in late 2019, the Coronavirus (COVID-19) disease has caused millions of deaths and confirmed cases around the world ². While most people make it through the acute phase of the disease, a significant number of people suffer with a variety of symptoms for several weeks to months following recovery ³. This is called as the post-COVID syndrome or “long COVID” and remains an important clinical and public health issue ⁴. The symptoms of post-COVID syndrome are fatigue, dyspnea, cough, chest discomfort, sleep disturbances, cognitive impairment, and psychological distress ⁵. Such symptoms can happen in patients with mild acute disease, and do not necessarily reflect the harshness of the acute infection ⁶. Fatigue is a symptom commonly and continually reported by COVID-19 survivors ⁷. The mechanisms remain unknown and are thought to include continuing inflammatory responses, immunological dysfunction, and damage to organs during acute infection, and psychological stress due to ill health and isolation ⁸. Recent evidence has also suggested a role for autonomic dysfunction and microvascular injury in the long COVID pathogenesis ⁹.

Post COVID symptoms can substantially impact the quality of life and functional capacity and return to normal daily function ¹⁰. Chronic symptoms could have a negative impact on work, social integration, and psychological health. It also puts extra stress on health systems by way of frequent visits to clinics and ongoing monitoring requirements ¹¹. Therefore, the pattern and predictors of post-COVID symptoms are crucial

to aid in planning effective follow-up care and rehabilitation strategies ¹². There are emerging data that suggest severity of the acute infection, hospitalization, oxygen therapy, and admission to an intensive care unit (ICU) may affect the development and duration of post-COVID symptoms ¹³. However, there are few data from many areas on the exact pattern of such symptoms and their association with clinical variables in recovered patients ¹⁴.

Thus, this study was created to evaluate the nature of post-COVID signs and symptoms in recovered sufferers within follow-up clinics and to investigate the relationship between the burden of signs and symptoms and clinical variables including severity of illness and treatment features. The results will help identify how COVID-19 impacts people in the long-term and to inform the creation of COVID-19 post-recovery care pathways.

Methodology

In this study, a cross-sectional analytical design was employed to verify the pattern of post-COVID symptoms among recovered patients and to determine the factors associated with the burden of symptoms after COVID recovery. The study took place in the post-COVID follow up clinics of healthcare settings during 2023 from April to August at Akhtar Saeed Hospital Lahore. The study involved adult patients with a prior diagnosis of COVID-19 and experienced their acute phase of illness and attending follow-up appointments for further assessment.

The total number of 150 participants were recruited through a non-probability consecutive sampling technique until the preferred sample size was met. Patients with a RT-PCR test result or positive SARS-CoV-2 antigen and a history of acute disease were included in the study if they were 18 years or older. Excluded were patients with pre-existing chronic debilitating illnesses that could potentially mask COVID-19 signs or symptoms as well as those who had known psychiatric disorders that could influence symptom reporting, and those who declined informed consent. An organized questionnaire was used to collect socio-demographic data, clinical information related to the acute COVID-19 infection, and lingering clinical symptoms. Medical records provided data on disease severity, hospitalization, need for oxygen, or admission to the ICU and days since recovery. Post-COVID symptoms were evaluated in a variety of areas such as fatigue, respiratory, musculoskeletal, neurological, and psychological.

Participants were classified as having a no symptom burden, mild symptom burden, or moderate/high symptom burden according to the number of symptoms reported. A higher symptom count was associated with a higher burden of post-COVID. IBM SPSS version 26.0 was used to enter and analyze data. Variables were concised with descriptive statistics, consists of standard deviation, mean, frequency and percentage. Pearson correlation analysis, multiple linear regression analysis, and chi-square tests were used in inferential analysis to identify predictors of the burden of symptoms after COVID-19. The P value >0.05 was regarded as statistically significant. All ethics committee statements were received before data was collected. All subjects gave informed written consent and confidentiality of patient data was carefully observed during the study.

Results

A total of 150 post-COVID recovered patients were involved in the study. The mean age of participants was 45.2 ± 13.6 years, with a slight male predominance (52.7%). The majority had mild to moderate COVID-19 infection during the acute phase. Post-COVID symptoms were reported in 71.3% of participants, with fatigue, dyspnea, and sleep disturbances being the most common complaints. Table 1 shows the demographic profile of the participants of the study. The majority of patients were in the 30–59 year age group with a slight male predominance. Most participants were urban residents and a large proportion were non-smokers. The sample reflects a relatively middle-aged population with diverse exposure backgrounds.

Table 1: Socio-Demographic characteristics of Post-COVID Patients (n = 150)

Variable	Category	n	%
Age (years)	<30	28	18.7
	30–44	54	36.0
	45–59	44	29.3
	≥60	24	16.0
Mean age ± SD	—	45.2 ± 13.6	—
Gender	Male	79	52.7
	Female	71	47.3
Residence	Urban	88	58.7
	Rural	62	41.3
Smoking Status	Yes	38	25.3
	No	112	74.7

Table 2 summarizes the clinical severity and management details during the COVID-19 infection' acute phase. Most patients experienced mild to moderate disease, while a smaller proportion had severe infection requiring ICU admission. Nearly half of the participants required hospitalization and one-third received oxygen therapy. These findings indicate variability in acute disease severity among participants.

Table 2: Clinical Characteristics during Acute COVID-19 (n = 150)

Variable	Category	n	%
Severity of Infection	Mild	62	41.3
	Moderate	58	38.7
	Severe	30	20.0
Hospitalization	Yes	66	44.0
	No	84	56.0
Oxygen Therapy	Yes	48	32.0
	No	102	68.0

ICU Admission	Yes	22	14.7
	No	128	85.3

Table 3 shows the frequency of persistent symptoms among recovered patients. The most common symptom was the fatigue, followed by dyspnea and sleep disturbances. A considerable proportion of patients also reported musculoskeletal pain, cognitive difficulties, and psychological symptoms. The results highlight the multisystem nature of post-COVID conditions.

Table 3: Prevalence of Post-COVID Symptoms (n = 150)

Symptom	n	%
Fatigue	82	54.7
Dyspnea (breathlessness)	64	42.7
Sleep disturbances	58	38.7
Joint/muscle pain	51	34.0
Chest discomfort	39	26.0
Headache	36	24.0
Cognitive fog (brain fog)	33	22.0
Anxiety/Depression	29	19.3
Palpitations	27	18.0
Hair loss	25	16.7

Table 4 categorizes participants based on the post-COVID symptoms' number experienced. Around one-third of patients reported no symptoms, while the remaining majority experienced varying degrees of symptom burden. Mild and moderate symptom burdens were most common, whereas a smaller proportion experienced severe multisymptom involvement. This indicates that most patients continue to experience at least some residual effects after recovery.

Table 4: Pattern of Post-COVID Symptom Burden (n = 150)

Symptom Burden	Criteria	n	%
No symptoms	None reported	43	28.7
Mild burden	1–2 symptoms	52	34.7
Moderate burden	3–4 symptoms	38	25.3
Severe burden	≥5 symptoms	17	11.3

Table 5 demonstrates a clear association between post-COVID symptom burden and acute COVID-19 severity. Patients with severe initial infection had a higher mean number of persistent symptoms compared to those patients who have mild disease. The difference across severity groups was statistically significant, indicating that acute disease severity is an important predictor of long-term outcomes.

Table 5: Association of Post-COVID Symptoms with Acute Disease Severity

Severity of acute COVID	Mean number of symptoms ± SD	p-value
Mild	1.9 ± 1.2	<0.001
Moderate	3.4 ± 1.6	
Severe	5.1 ± 2.0	

Table 6 presents correlations between clinical variables and post-COVID symptom burden. Positive correlations were observed with age, hospitalization, oxygen therapy, and ICU admission, indicating higher symptom burden in more severe cases. A negative correlation with time since recovery suggests gradual symptom improvement over time.

Table 6: Correlation between Clinical Factors and Post-COVID Symptom Burden

Variable	r-value	p-value
Age	0.21	0.012
Hospitalization	0.38	<0.001
Oxygen therapy	0.42	<0.001
ICU admission	0.45	<0.001
Duration since recovery	-0.19	0.028

Table 7 identifies independent predictors of post-COVID symptom burden. Severe acute infection, ICU admission, and oxygen therapy were significant predictors of higher symptom burden. Age also showed a modest positive association, while smoking status was not statistically significant. The model explained a substantial proportion of variance in symptom burden.

Table 7: Predictors of Post-COVID Symptom Burden (Regression Analysis)

Predictor	β	p-value
Severe acute infection	0.36	<0.001
ICU admission	0.29	0.002
Oxygen therapy	0.24	0.006
Age	0.17	0.031
Smoking status	0.12	0.089

Discussion

The current study aimed to assess the perseverance of symptoms in those recovered from COVID-19 and attended follow up clinics. The results confirmed that the prevalence of post-COVID symptoms was still very high with over two thirds of the study subjects experiencing such symptoms. The most common symptom stated was fatigue, followed by dyspnea and sleep disturbances. Moreover, patients who developed severe acute infection, hospitalization, oxygen therapy, or were admitted to ICU had significantly higher burden of post-COVID symptoms. The prevalence of symptoms similar to those observed in this study has been reported by other studies of post-COVID syndrome, where the common complaints were fatigue and respiratory symptoms and remain persistent for several months after recovery^{15,16} These findings have important implications, as they suggest that the overall health burden of COVID-19 is substantial in the long term.

Fatigue, dyspnea, and sleep problems were the most common symptoms in this study, which is consistent with previous research that found these symptoms to be the main causes of long-term COVID¹⁷ According to earlier research, chronic inflammatory reactions, autonomic dysfunction, mitochondrial impairment, and decreased physical fitness after an acute infection may all contribute to persistent weariness¹⁸. Similarly, sleep difficulties may be linked to psychological stress, disturbed circadian rhythms, and persistent systemic inflammation, while dyspnea may indicate persisting pulmonary abnormalities, poor gas exchange, or respiratory muscle weakness^{19,20}. The multisystem nature of post-COVID illness described in recent work is further supported by the fact that a significant percentage of individuals experienced psychological symptoms and cognitive difficulties²¹.

There was a noticeable relationship between the harshness of the acute illness and the burden of symptoms²². Severe COVID-19 patients reported significantly more symptoms that lasted after the acute phase than patients with mild COVID-19. Likewise, there were positive correlations between symptom burden and hospitalization, oxygen therapy, and admission to the ICU and age. Previous cohort and follow-up studies showed that the risk of long term sequelae were associated with the severity of acute illness and intensive medical interventions, which may reflect the extent of organ injury, inflammation, deconditioning and psychological stress²³. Additionally, the negative correlation between symptom burden and time since recovery implies the symptoms are likely to get better over time, which has also been reported in longitudinal research that assessed COVID-19 recovery trajectories in survivors²⁴.

Multiple regression analysis showed severe acute infections to be the most significant independent risk factor for the burden of post-COVID symptoms, followed by admission to the ICU and requiring oxygen therapy. The results suggest that the degree of severity of the initial illness is a key factor in influencing recovery outcomes. Acute disease characteristics were shown to be clinically relevant in predicting post-COVID health status because the model accounted for 52% of the variance in the symptom burden. The findings from a clinical view point lend support to the launch of structured follow-up programmes for patients who have been discharged from hospital after suffering from severe COVID-19²⁵. Ongoing evaluation of physical, respiratory, neurological and psychological symptoms can help with early intervention, rehabilitation and quality of life²⁶. Multidisciplinary rehabilitation programs that include the involvement of physicians, physiotherapists, respiratory therapists, and mental health professionals may be especially helpful for patients who are at high risk for a high burden of persistent symptoms^{27,28}

The limitations of this study should also be taken into account when interpreting the findings. The cross-sectional approach does not enable causal inference of the relationship between characteristics of acute disease and symptom burden after COVID. Follow-up clinics were used to obtain data, and a consecutive sampling method was used; this might restrict the generalizability of the findings to larger populations. Additionally, the majority of the symptom data was self-reported and also may be prone to recall bias. Large-scale, multicenter, long-term studies with objective clinical evaluations are necessary to better describe the natural history of post-COVID syndrome. Biological mechanisms responsible for long-term symptoms and the effectiveness of specific rehabilitation interventions to enhance long-term outcomes and recovery in COVID-19 survivors warrants further investigation.

Conclusion

Among recovered patients, post-COVID symptoms are still very common; the most often mentioned concerns are fatigue, dyspnea, and sleep difficulties. The severity of the initial COVID-19 infection was substantially correlated with the burden of persistent symptoms, especially in individuals who needed hospitalization, oxygen therapy, or ICU admission. The long-term COVID-19 health effects are highlighted by these findings, which also underscore the necessity of interdisciplinary rehabilitation, structured follow-up services, and continuous monitoring of patients at high risk. COVID-19 survivors' quality of life, functional status, and recovery results may all be enhanced by early detection and treatment of persisting symptoms.

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Conflict of Interest

None

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Use of Artificial Intelligence

The corresponding author declared that no artificial intelligence or AI-assisted tools were used in this manuscript.

Authors' Contribution

AK, SA and MR contributed significantly and equally as per ICMJE. All authors gave their final approvals to publish this article.

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