

Tracking Health Beyond Recovery: A Study on Identifying Post-COVID Syndrome Symptoms

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ABSTRACT

Context: The COVID-19 pandemic had a profound global impact, leaving a lasting legacy in the form of post-COVID syndrome. This condition, experienced after recovering from the virus, manifests in symptoms, such as fatigue, cough, shortness of breath, joint pain, and brain fog, highlighting the virus's lingering influence on the human body.

Aim: To Identify post-COVID syndrome symptoms among COVID-19 recovered patients from Karad Taluka.

Materials and methods: A study involving 228 COVID-19-recovered individuals from a Karad tertiary care hospital used consecutive sampling. Data were collected via structured questionnaires, focused on post-COVID syndrome symptoms.

Statistical analysis used: Frequency and percentage were used to analyze the presence of post-COVID syndrome symptoms.

Results: A total of 228 COVID-19-recovered individuals were included in the study, of whom 53% were male and 47% were female. Most of the study subjects had 25 (10.9%) mild, 138 (60.5%) moderate, and 65 (28.5%) severe symptoms. Symptom-wise, the majority of the subjects experienced symptoms: fatigue 116 (50.8% moderate), shortness of breath 135 (58.3% moderate), cough 116 (50.8%), sore throat 115 (50.4% mild), chest pain (57% mild), joint pain 151 (66.2% severe), brain fog 103 (45% severe). Most (43%) experienced symptoms for 12 months, that is, 1 year.

Conclusion: The results depict the recovered individuals continue to experience symptoms. The most common symptoms are fatigue, shortness of breath, and cough in varied severity (from mild, moderate, and severe).

Keywords: COVID-19, Persistent symptoms, Post-COVID syndrome, Symptoms persistence after COVID-19.

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HIGHLIGHTS

This pioneering research on post-COVID syndrome in 228 individuals recovered from Karad Taluka unveils a persistent impact, with 43% experiencing symptoms for up to 12 months. Notably, fatigue, shortness of breath, and cough endure in varying severity. These findings underscore the immediate need for ongoing research and precise medical interventions to address the nuanced and enduring manifestations of post-COVID syndrome.

INTRODUCTION

The 2019 coronavirus disease pandemic (COVID-19), caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), resulted in the deaths of approximately 5.3 million people worldwide as of November 2021.¹ Despite most individuals recovering from the acute stage of the virus within a few weeks, some continue to experience new or persistent symptoms months after their diagnosis. This phenomenon, known as post-COVID syndrome, protracted COVID-19, or post-acute sequelae of SARS-CoV-2 infection (PASC)/long COVID has emerged as a significant public health concern.

Post-COVID syndrome is characterized by the continuation or development of symptoms that cannot be explained by an alternative diagnosis, occurring at least 3 months after the onset of COVID-19 and persisting for at least 2 months or more without any conclusive diagnosis.² These symptoms can vary widely in type, severity, and duration, affecting multiple organ systems and domains of functioning. Commonly reported symptoms include fatigue, shortness of breath, brain fog, chest pain, joint or muscle

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pain, headaches, depression, and anxiety. However, more than 200 different symptoms have been associated with post-COVID syndrome.

Estimating the prevalence of post-COVID syndrome is challenging due to the condition's heterogeneity and the absence of standardized diagnostic criteria. However, various studies suggest that between 10 and 20% of those infected with SARS-CoV-2 might develop post-COVID syndrome.³ According to a recent analysis by the Institute for Health Metrics and Evaluation (IHME), by the end of 2021, 3.92 billion people had contracted SARS-CoV-2. Of these, 3.7% (144.7 million) developed post-COVID syndrome as defined by the World Health Organization (WHO) clinical case definition,² with 15.1% (22 million) still exhibiting symptoms 12 months after infection onset.⁴

The global burden of post-COVID syndrome likely varies across regions and countries, influenced by the epidemiology of COVID-19, healthcare availability and accessibility, and socioeconomic and cultural factors that shape health-seeking behaviors and outcomes. In India, with over 34 million cases and 460 thousand deaths reported as of November 2021, post-COVID syndrome presents a significant challenge to the health system and society. A study by the Indian Council of Medical Research (ICMR) from August 2021 revealed that nearly 6.5% of those hospitalized with COVID-19 died within the following year, and 17.1% experienced post-COVID conditions, such as fatigue, breathlessness, or cognitive abnormalities. This study also indicated that vaccination reduced the risk of death by 60% among post-COVID patients.⁵ Given the potential impact of post-COVID syndrome on morbidity, mortality, quality of life, and healthcare utilization, there is an urgent need to identify its symptoms, risk factors, mechanisms, and management strategies.⁶⁻⁸

Past experiences with another coronavirus, the severe acute respiratory syndrome coronavirus (SARS-CoV), revealed post-viral fatigue syndrome/myalgic encephalomyelitis as a prevalent symptom. As previously reported, the virus can reach the hypothalamus via the olfactory pathway, disrupting its lymphatic drainage. This disruption leads to the formation of pro-inflammatory cytokines, interleukins, and interferon gamma within the hypothalamus, resulting in post-viral fatigability.^{9,10}

This research study aims to enhance our understanding of post-COVID syndrome by identifying specific symptoms, thereby informing future research and policy interventions to address its challenges and implications.

MATERIALS AND METHODS

Study Design

A cross-sectional research design was used to conduct the study. It was conducted in a tertiary care hospital in Karad.

Sample and Sampling Technique

About 221 recovered individuals from COVID-19 and discharged from Karad tertiary care hospital were included as study subjects.

The desired sample size was calculated using the following formula:

$$= \frac{Z^2 Pq}{d^2}$$

$$Z^2 = 1.96$$

$$P = \% \text{ of symptoms}$$

$$q = 100 - P$$

$$d^2 = 6\% \text{ Allotment error}$$

Using a reference from a study by Reaz Mazhmud et al. (2021), "Post-COVID-19 syndrome among symptomatic COVID-19 patients: A prospective cohort study in a tertiary care center in Bangladesh".

Following the consecutive sampling technique, the target population was approached and screened until the desired number was obtained.

Inclusion and Exclusion Criteria

COVID-19-recovered individuals discharged from tertiary care hospitals in Karad in the age-group of 15–60 years were included in the study.

Rather, those who are non-hospitalized COVID-19-recovered individuals and those with critical medical conditions were excluded from the study.

Data Collection Tools

Sociodemographic Variables (Section I)

Considering the scenario of post-COVID syndrome, there was a need for certain variables, such as age, sex, education, COVID-19 symptoms, High-resolution computed tomography (HRCT) score, etc. to be included as sociodemographic variables.

Symptom Severity Tool (Section II)

A structured and validated symptoms severity tool was developed to assess the symptoms of post-COVID syndrome. It had 14 items (certain questions) intended to measure post-COVID syndrome symptoms and duration. Each symptom was measured on a 4-point scale (no, mild, moderate, or severe).

Ethical Considerations

The present study was approved by the Institutional Ethical Committee of Krishna Vishwa Vidyapeeth (Deemed to be University), Karad (Ref. No. KIMSDU/IEC/07/2021).

Data Collection and Management

Necessary permissions such as from Medical Director, tertiary care hospital (Krishna Hospital Karad), Taluka Health Officer, Karad. And then, after the target population was identified (COVID-19 recovered and discharged individuals) and after screening, the 221 individuals were selected and further approached for data collection after informed consent.

Data Analysis

The collected data were compiled in MS Excel and analyzed in tabular and graphical form. It was analyzed in the form of frequency and percentages for symptoms and presented in graphs.

RESULTS

Section I

Table 1 depicts the distribution of sociodemographic variables. As per age 45% (103) of the participants were aging 30–44 years. Majority of the participants, that is, 53% (120) were males. About 38% (87) participants had secondary education. From all participants, 92% (210) had fatigue, 87% (198) had headache, 80% (182) had fever, loss of taste 76% (175) as COVID-19 symptoms on admission to hospital. As per HRCT score 78% (177) had score 9–15.

Section II

It deals with the analysis of frequency and percentage of symptoms of post-COVID syndrome among COVID-19 recovered individuals.

Figure 1 shows the distribution of study subjects according to post-COVID syndrome symptoms in pre-assessment. In pre-assessment, majority of the study subjects about 25 (10.9%) had mild, 138 (60.5%) moderate, and 65 (28.5%) severe symptoms.

Table 2 presents the post-COVID syndrome symptoms among COVID-19 recovered individuals. Majority of the subjects had following symptoms fatigue 50.8% (116) moderate, shortness of breath 58% (133) moderate, cough 50.8% (116), sore throat 50.4% (115) mild, chest pain 57% (130) mild, joint pain 66.2% (151) severe, anorexia 50.4% (115) moderate, loss of taste and smell 56.1% (128) mild, stomachache and diarrhea 57% (130) mild, insomnia 45% (105)

Table 1: It deals with analysis of demographic variables of study participants (*n* = 228)

Sr. No.	Sociodemographic variables	Frequency	Percentage
1	Age		
	15–29 years	26	11%
	30–44 years	103	45%
	45–60 years	99	43%
2	Gender		
	Male	120	53%
	Female	108	47%
3	Education		
	Illiterate	18	8%
	Primary	54	24%
	Secondary	87	38%
	High secondary	69	30%
4	COVID-19 symptoms		
	Fatigue	210	92%
	Shortness of breath	139	61%
	Sore throat	116	51%
	Cough	116	51%
	Chest pain	50	22%
	Headache	198	87%
	Joint pain	109	48%
	Loss of taste and smell	175	76%
	Anorexia	109	48%
	Diarrhea	30	13%
	Fever	182	80%
	Ringing in the ear	42	18%
5	HRCT score		
	<8	13	6%
	9–15	177	78%
	16–25	36	16%
	No	2	0.8%

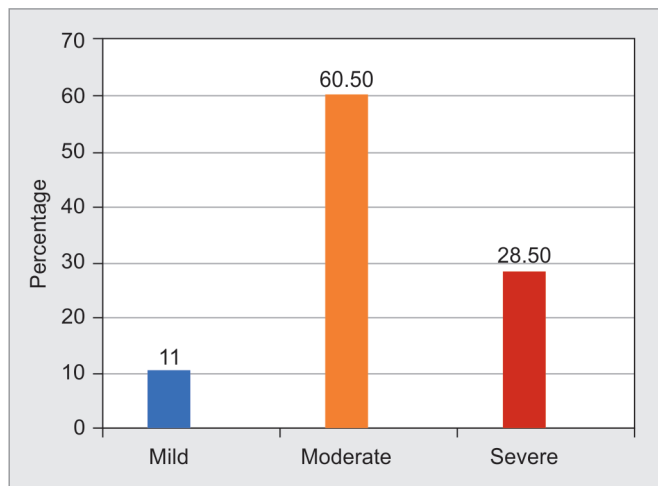


Fig.1: Analysis of frequency and percentage of symptoms of post-COVID syndrome among COVID-19 recovered individuals

moderate, brain fog 45% (103) severe. As per time period of post-COVID syndrome symptoms majority 43% (98) participants had symptoms for 12 months.

DISCUSSION

The concerns surrounding persistent symptoms in COVID-19 survivors are well founded, considering the lingering effects observed in survivors of previous coronavirus outbreaks, such as severe acute respiratory syndrome (SARS) in 2003 and Middle East respiratory syndrome (MERS) in 2012.⁹ As of SARS (2003) and MERS (2012), its impact on the body was shown in the form of various symptoms. So, after recovery from COVID-19, this virus is somewhat cleared from the body but that remnants in pockets show its presence in the form of symptoms.

In this study, 228 COVID-19 people recovered and discharged from a tertiary care hospital were studied. Considering the facts about COVID-19 and its post-COVID syndrome that shows symptoms with other evidences such as comprehensive review conducted by Lopez-Leon et al., it was found that a significant proportion of post-COVID-19 patients, approximately 80% (with a 95% confidence interval ranging from 65 to 92%), continued to experience one or more symptoms beyond 2 weeks following the initial acute infection.¹¹

Considering the nature and trajectory of infection with the COVID-19 virus, it was thought that whatever the severity of the COVID-19 infection, it will cause certain symptoms to all individuals in more or less a way. This was evident with study by Morin et al. reported that 51% of patients in a cohort of 478 hospitalized individuals still reported at least one persistent symptom 4 months after their initial COVID-19 diagnosis.¹²

Similarly, a review by Pavli et al. estimated the incidence of post-COVID syndrome to range from 10 to 35% among outpatient patients, increasing to a substantial 85% among hospitalized patients.¹³ The study also highlighted the presence of post-COVID syndrome in individuals who were hospitalized and proved its presence.

The demographic factors considered in this study, including age, gender, education status, COVID-19 symptoms on admission, and HRCT score, provide valuable insights into the profile of post-COVID syndrome in this specific population. Notably, Table 1 presents the age distribution revealed a higher prevalence of COVID-19 recovery among individuals aged 30–44 years (45%) and 45–60 years (43%), with males comprising 53% of the study cohort. A significant proportion of subjects (38%) had a secondary education level.

As this study was conducted in Karad taluka which had a tertiary care hospital (Krishna Hospital and Medical Research Center, Karad) a COVID dedicated center, more of residential of Karad successfully got treated and recovered. Taking into account the geographic area of Karad, the large number of infected cases and the available treatment facilities also impacted this research.

When comparing demographic variables with other studies, such as, for instance, Mahmud et al. reported that 60% of their patients were under 40 years of age, with only 8% over 60 years.¹⁴ This study also had an age-group like the present study. Additionally, a study by Khodeir et al. conducted in Saudi Arabia found that the majority of subjects (57.1%) were between 20 and 39 years of age, and 36.2% were within the age-group of 40–59 years age-group.¹⁵ These variations can be attributed to factors such as geographical differences and local spread of infections.

Regarding post-COVID syndrome symptoms, Figure 1 revealed that 60.5% of the 228 COVID-19 recovered individuals experienced a moderate level of symptoms, with 10.9% reporting mild symptoms and 28.5% exhibiting severe symptoms. This highlights the lasting

Table 2: The remaining part of the section deals with the identification of each symptom of post-COVID syndrome (%) among recovered individuals from COVID-19

SR. No.	Post-COVID syndrome symptoms	None	Mild	Moderate	Severe
1	Fatigue	0	8 (3.5%)	116 (50.8%)	104 (45.6%)
2	Shortness of breath	7 (3%)	47 (20.6%)	133 (58%)	41 (17.9%)
3	Cough	20 (8.7%)	116 (50.87%)	91 (39.9%)	1 (0.4%)
4	Having sore throat	20 (8.7%)	115 (50.4%)	94 (47.7%)	0
5	Chest pain	68 (29.8%)	130 (57%)	28 (12.2%)	2 (0.8%)
6	Joint pain	0	10 (4.3%)	67 (29.3%)	151 (66.2%)
7	Headache	4 (1.7%)	34 (14.9%)	115 (50.4%)	75 (32.8%)
8	Negative thoughts	24 (10.5%)	145 (63.5%)	54 (23.68%)	5 (2.19%)
9	Anorexia	18 (7.8%)	51 (22.3%)	115 (50.4%)	44 (19.2%)
10	Loss of taste and smell	64 (28.07%)	128 (56.14%)	31 (13.59%)	5 (2.19%)
11	Stomachache and diarrhea	50 (21.9%)	130 (57.0%)	48 (21%)	0
12	Insomnia	6 (2.6%)	31 (13.5%)	105 (46.5%)	86 (37.7%)
13	Brain fog	3 (1.3%)	32 (14%)	90 (39.7%)	103 (45.1%)
<i>Time period of post-COVID syndrome symptoms</i>			<i>1–5 months</i>	<i>6–11 months</i>	<i>12 months</i>
			62 (27%)	68 (30%)	98 (43%)

impact of COVID-19 on individuals, with a diverse array of symptoms persisting even after recovery.

A detailed analysis of these symptoms on a 4-point severity scale (no, mild, moderate, and severe) revealed several key findings. Fatigue, shortness of breath, cough, sore throat, chest pain, joint pain, headache, negative thoughts, anorexia, loss of taste and smell, stomachache, diarrhea, insomnia, and brain fog were consistently reported by all subjects, albeit to varying degrees.

Table 2 depicted that fatigue emerged as the most common symptom, affecting 116 (50.8%) of subjects at a moderate level. Similarly, shortness of breath 135 (58.3%), cough 116 (50.8%), and sore throat 115 (50.4%) were prevalent at varying intensities. Interestingly, joint pain 151 (66.2%), chest pain 130 (mild 57%), anorexia 115 (50.4%), and stomachache and diarrhea 130 (57%), headache 115 (50.4%), negative thoughts 145 (63.5%) exhibited varying degrees of severity. Insomnia 105 (45%) and brain fog 103 (45%) were also reported by a substantial number of individuals. The duration for which these symptoms persisted varied, with the majority (43%) experiencing symptoms for up to 12 months post-recovery.

Comparing these findings with other studies, it becomes evident that post-COVID syndrome manifests differently between. Interestingly, the results reveal individuals, with fatigue being a consistent and predominant symptom. Possible mechanisms underlying these persistent symptoms include inflammation, nervous system involvement, psychological stress, altered immune responses, disruptions in the gut microbiome, and viral reservoirs.¹⁶ Geographical differences, infection spread patterns, age, and gender could also influence symptom profiles.

CONCLUSION

In conclusion, this study adds to the growing body of evidence on post-COVID syndrome, underscoring its complex and varied nature. The high prevalence of persistent symptoms emphasizes the need for continued research and medical attention to address the enduring and diverse symptoms associated with this condition.

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REFERENCES

- World Health Organization. COVID-19 Dashboard [Internet]. Available from: <https://covid19.who.int/>.
- World Health Organization. Post COVID-19 condition [Internet]. Available from: <https://www.who.int/news-room/feature-stories/detail/post-covid-19-condition>.
- Al-Aly Z, Xie Y, Bowe B. High-dimensional characterization of post-acute sequelae of COVID-19. *JAMA Intern Med* 2022;182(10):1343–1354. DOI: 10.1038/s41586-021-03553-9.
- Institute for Health Metrics and Evaluation. COVID-19 Projections [Internet]. Available from: <https://covid19.healthdata.org/global?view=post-covid-syndrome&tab=trend>.
- Indian Council of Medical Research. Post-COVID sequelae in India (PCSIN) study: A National Cohort Study to understand the post-COVID sequelae and its impact on health systems in India (Phase I Report) [Internet]. Available from: https://main.icmr.nic.in/sites/default/files/press_release_files/PCSIN_Phase_I_Report.pdf.
- Nalbandian A, Sehgal K, Gupta A, Madhavan MV, Mc Groder C, Stevens JS, et al. Post-acute COVID-19 syndrome. *Nat Med* 2021;27(4):601–615. DOI: 10.1038/s41591-021-01283-z.
- Reenhalgh T, Knight M, A'Court C, Buxton M, Husain L. Management of post-acute covid-19 in primary care. *BMJ* 2020;370:m3026. DOI: 10.1136/bmj.m3026.
- Rajkumar RP, Kumaran SP, Thilakavathy R. Post-COVID syndrome: A comprehensive review of the current evidence and possible pathophysiological mechanisms involved in long-term sequelae of COVID-19 infection. *J Neurovirol* 2021;27(5):649–665.
- Ahmed H, Patel K, Greenwood DC, Halpin S, Lewthwaite P, Salawu A, et al. Long-term clinical outcomes in survivors of severe acute respiratory syndrome and Middle East respiratory syndrome coronavirus outbreaks after hospitalisation or ICU admission: A systematic review and meta-analysis. *J Rehabil Med* 2020;52(5):jrm00063. DOI: 10.2340/16501977-2694.
- Moldofsky H, Patcai J. Chronic widespread musculoskeletal pain, fatigue, depression and disordered sleep in chronic post-SARS syndrome: A case-controlled study. *BMC Neurol* 2011;11:37. DOI: 10.1186/1471-2377-11-37.
- Lopez-Leon S, Wegman-Ostrosky T, Perelman C, Sepulveda R, Rebolledo PA, Cuapio A, et al. More than 50 long-term effects of COVID-19: A systematic review and meta-analysis [Internet]. 2021 medRxiv 2021;2021.01.27.21250617. DOI: 10.1101/2021.01.27.21250617.
- Writing Committee for the COMEBAC Study Group; Morin L, Savale L, Pham T, Colle R, Figueiredo S, Harrois A, et al. Four-month clinical status of a cohort of patients after hospitalization for COVID-19. *JAMA* 2020;325(15):1525–1534. DOI: 10.1001/jama.2021.3331.

13. Pavli A, Theodoridou M, Maltezou HC. Post-COVID syndrome: Incidence, clinical spectrum, and challenges for primary healthcare professionals. *Arch Med Res* 2021;52(6):575–581. DOI: 10.1016/j.arcmed.2021.03.010.
14. Mahmud R, Rahman MM, Rassel MA, Monayem FB, Sayeed SKJB, Islam MS, et al. Post-COVID-19 syndrome among symptomatic COVID-19 patients: A prospective cohort study in a tertiary care center of Bangladesh. *PLoS ONE* 2021;16(4):e0249644. DOI: 10.1371/journal.pone.0249644.
15. Khodeir MM, Shabana HA, Rasheed Z, Alkhamiss AS, Khodeir M, Alkhowailed MS, et al. COVID-19: Post-recovery long-term symptoms among patients in Saudi Arabia. *PLoS ONE* 2021;16(12):e0260259. DOI: 10.1371/journal.pone.0260259.
16. Bastola A, Nepal R, Shrestha B, Maharjan K, Shrestha S, Chalise BS, et al. Persistent symptoms in post-COVID-19 patients attending follow-up OPD at Sukraraj Tropical and Infectious Disease Hospital (STIDH), Kathmandu, Nepal. *Trop Med Infect Dis* 2021;6(3):113. DOI: 10.3390/tropicalmed6030113.