

ORIGINAL RESEARCH

CORONA EXPERIENCE

Prevalence of post–COVID syndrome in a cohort of faculty of a medical institute and their family members

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Abstract

Background & Objective: Persistent or new appearance signs and symptoms in post–COVID patients is a well–recognized complication of the COVID-19 pandemic, the severity of which is still underestimated and, therefore, remains unaddressed. Multiple studies from all over the world have documented the prevalence of post–COVID symptoms; however, the frequency, the severity and the variety of post–COVID symptoms in our country has not been much investigated. We determined the prevalence of post–COVID syndrome in a cohort of faculty working in Fazaia Ruth Pfau Medical College (FRPMC), Karachi, Pakistan, and their family members.

Methodology: This cross–sectional, descriptive single–center study was conducted in a medical institute, data was gathered with a questionnaire sent to the cohort of medical faculty and their families. Data was analyzed on SPSS 20 and ODDs Ratio calculated using different variables.

Results: A total of 84 patients were enrolled which had suffered from COVID out of which 51 (60.7%) had post–COVID symptoms, with fatigability 40 (48%), muscle pain 16 (19%), inability to continue the normal chores 12(14%), dry cough 11 (13%), breathlessness 10(12%), sleep disturbance and brain fog or difficulty in concentration 11 (13%), and hair loss 9 (11%) being the common complaints. There was no positive or negative relationship between the severity of COVID infection and the presence of the post–COVID syndrome.

Conclusion: The prevalence of post–COVID symptoms in COVID infected population is high, however, no identifiable risk factor is observed. A multidisciplinary team approach is much needed to cater for the needs of the vulnerable post–COVID population, more observational studies are needed to follow the sequel of this comparatively new virus which may still be unidentified.

Key words: Post–COVID syndrome; Fatigue; COVID–19

Citation: Kidwai SS, Zahra F, Umar M, Ahmed A, Rao ZA, Sattar RA. Prevalence of post-COVID syndrome in a cohort of faculty of a medical institute and their family members. *Anaesth. pain intensive care* 2022;26(2):154-160; **DOI:** [10.35975/apic.v26i2.1807](https://doi.org/10.35975/apic.v26i2.1807)

Received: January 03, 2022, **Reviewed:** February 20, 2022, **Accepted:** March 02, 2022

1. Introduction

As the global count of corona victims is continuously increasing with mutating corona virus, post-COVID signs and symptoms have become a well-recognized entity in the surviving victims of the ongoing pandemic. The persistent symptoms experienced following COVID-19 infection have been termed as 'post-COVID syndrome' (PCS) or 'long COVID syndrome' or 'long haul syndrome', and can be related to residual inflammation following infection, secondary to organ damage and/or due to social isolation and fear of death of self and near and dear ones. We define these as persistent symptoms and/or delayed or long-term complications of SARS-CoV-2 infection beyond 4 weeks from the onset of symptoms.¹ PCS is not only limited to patients with

severe acute COVID-19, it is also prevalent in people suffering from mild illness. However, the duration of post-COVID symptoms in such cases may last for a shorter duration.²

Fatigue, dyspnea, psychological distress such as post-traumatic stress disorder (PTSD), anxiety, depression and concentration / sleep abnormalities, were noted in approximately 30% of the participants in a study from UK.³ Another study from USA identified the presence of post-COVID symptoms in 32.6% of the discharged patients.³

Most of the studies published in the last two years include data from China, and European countries like Italy, Spain, and France.⁴ However, no such data is available from our population yet. We are in a dire need of a protocol to follow these patients after discharge from the

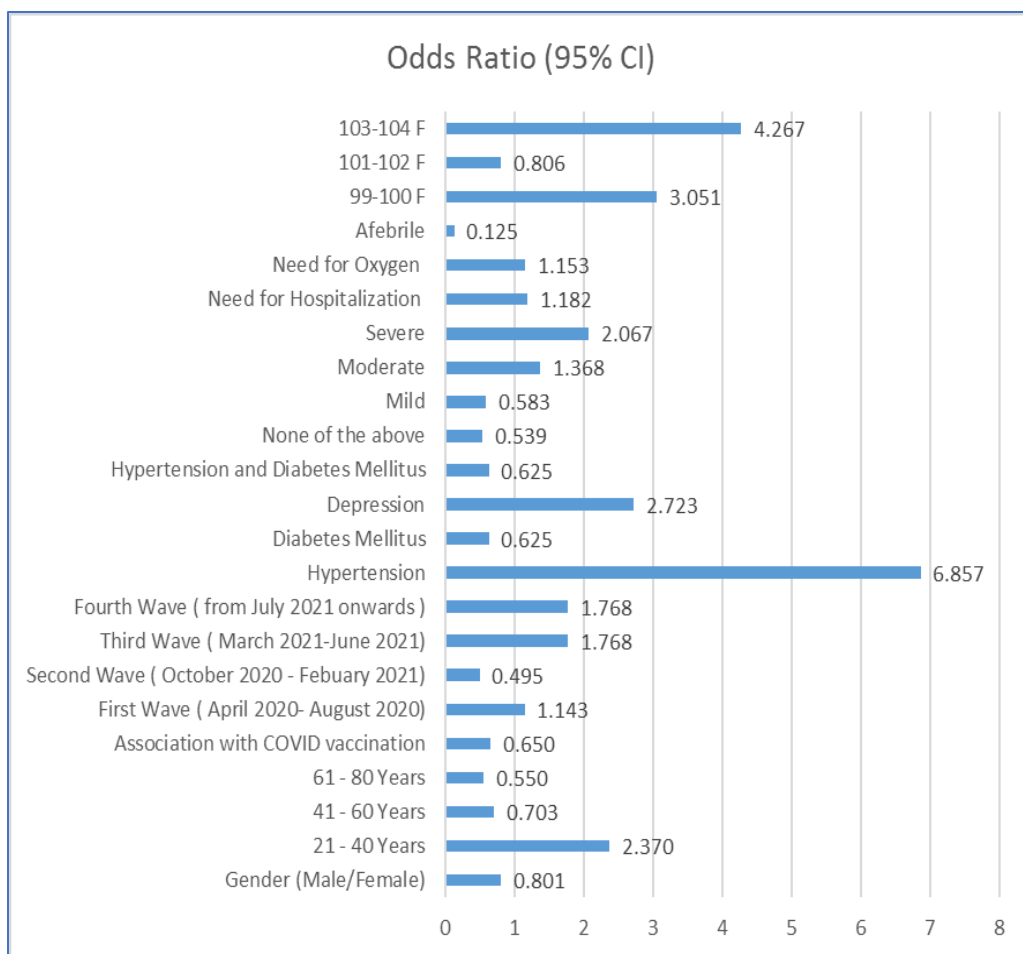


Figure 1: Graphical representation of ODD's Ratio of post-COVID Syndrome in relation to different variables

hospital for at least 3 months of their initial presentation, or more, depending on the disease severity. We need to periodically evaluate our patients for the presence of these symptoms and provide necessary care required to decrease the morbidity. The future of COVID is still ambiguous and we need to prepare for its management and prevent its consequences.

We conducted this study to identify the frequency of PCS. It would highlight the importance of formulating a standardized protocol to follow the discharged patients, record any residual after-effects, and thus allow us to improve the quality of care in the hospital.

2. Methodology

This cross-sectional, descriptive single-center study was conducted in the Department of Medicine, PAF Base Faisal Hospital. After taking informed consent, all the male and female faculty members of Fazaia Ruth Pfau Medical College (FRPMC), who suffered from COVID infection and who tested positive by polymerase chain reaction (PCR) test, were included in the study. Ethical approval was taken from the Ethical Review Committee, Ref No. IRB/15. The study was conducted during September 2021, using non-probability convenient sampling technique. The data used in this study was collected through an online survey questionnaire comprising 22 feedback questions. The link of this online survey questionnaire was sent through e-mails or WhatsApp contacts of faculty members working in FRPMC, and filled by the faculty members themselves or by interviewing their family members who were 15 y or older. Pregnant females, and those who were known to have chronic kidney disease and were on dialysis, chronic liver disease or suffering from heart failure with ejection fraction of $\leq 40\%$ before contracting the COVID, were excluded from the study, as these could have interfered with the fair and meaningful analysis of the results.

Table 1: Detail of Information/feedbacks

Variables		n	(%)
Gender	Male	43	51.19
	Female	41	48.81
Age Groups	21 - 40 years	33	39.29
	41 - 60 years	29	34.52
	61 - 80 years	22	26.19
	Mean Age Males -	50.86 \pm 15.72	
	Mean Age Female -	43.27 \pm 12.86	
	Mean Age Overall -	47.15 \pm 14.81	
Association with Vaccination	Before Vaccination	58	69.05
	Partially Vaccination	7	8.33
	After Complete Vaccination	19	22.62
Wave - Infected with COVID	First Wave (Apr 2020 - Aug 2020)	16	19.05
	Second Wave (Oct 2020 – Dec 2020)	35	41.67
	Third Wave (Mar 2021 - Jun 2021)	13	15.48
	Fourth Wave (from Jul 2021 onwards)	11	13.10
	1 st & 4 th Wave	3	3.57
	1st, 2nd & 4th Wave	1	1.19
	1st & 2nd Wave	1	1.19
	Twice in 1st wave	1	1.19
	Twice in 2nd wave	2	2.38
Twice in 3rd wave	1	1.19	
Intensity of Fever (°F)	Afebrile	14	16.67
	99-100°F	30	35.71
	101-102°F	33	39.29
	103-104°F	7	8.33
Need for Hospitalization	Yes	21	25.00
Severity of COVID	Mild	39	46.43
	Moderate	37	44.05
	Severe	8	9.52
Comorbid	Depression	5	5.95
	Diabetes Mellitus	6	7.14
	Hypertension	10	11.90
	Hypertension; Diabetes Mellitus	6	7.14
	None of the above	57	67.86
Post COVID Syndrome	Positive	51	60.71

Statistical analysis:

Responses were analyzed and evaluated by using Microsoft Excel & IBM-SPSS version 20. The comparisons among different variables are presented

through tables and graphs. Level of significance was determined with 95% confidence interval and P values were obtained. Associations between disease severity, other explanatory variables and PCS is evaluated by Chi-square (χ^2) test and Odds ratio (OR).

3. Results

A total of 84 responses were collected from the faculty and doctors that had suffered from COVID infection, with 43 males and 41 females, out of these 51 (60.7%) had post-COVID symptoms, which is an alarming figure. Mean age of the sample was 47 ± 14 y. Most of the subjects (44%) were affected in the second wave. The demographic characteristics are given in Table 1. 90% of the patients with COVID had mild to moderate symptoms; therefore, did not need hospitalization. Only 21 (25%) patients were hospitalized. Frequency of COVID was more in the first and second waves, compared to the period after the second wave, when it was affected due to aggressive vaccination campaign in the country.

The frequency of common symptoms of PCS is shown in Table 2. Fatigue was the most common complaint, e.g., 42 (50%) patients after COVID-19 infection; followed by myalgia 16 (19%), dry cough 13 (15%), sleep disturbance 13 (12%) and brain fog or impaired concentration 11 (13%). Tabulation of ODD's Ratio analysis with different variables and its graphical representation is shown in Table 3 and Figure 4. The ODD's of having PCS is shown to be more with patients suffering from severe disease, and patients who needed oxygen and hospitalization. Interestingly, male gender and hypertensive patients were observed to be more affected with post-COVID symptoms.

4. Discussion

PCS appears to be a multi-system disease, occurring even after a relatively mild acute illness.^{5,6} This observation has been replicated in our study too, which shows equal chances of having these symptoms in all patients even in those having mild fever or in afebrile patients. Our study observes the presence of PCS in 51 (60.7%) participants.

It is hypothesized that the body's innate immune response during a SARs-COV-2 infection results in inflammatory cytokine production, which causes these lingering symptoms and signs of COVID-19 infection. It was also observed during the previous viral epidemics; e.g., SARS epidemic of 2003 and the Middle East Respiratory Syndrome (MERS) outbreak of 2012. In the post-infection period of both episodes a similar sequel was observed.^{7,8}

Patients with COVID-19 may develop chronic fatigue syndrome, which presents with prolonged relapse of

Table 2: Frequency of post COVID 19 symptoms in the cohort (n = 84)

Post COVID Symptoms	n	(%)
Muscle pain	16	19.05
Headache	0	0.00
Fatigue	42	50.00
Change in smell or taste	0	0.00
Sleep disturbance	10	11.90
Dry cough	13	15.48
Breathlessness	10	11.90
Fever	2	2.38
Anxiety	0	0.00
Joint pain	0	0.00
Oxygen needed	0	0.00
Diarrhea	0	0.00
Rash	0	0.00
Palpitation	6	7.14
Depression	5	5.95
Unable to perform routine activities	12	14.29
Difficulty thinking or concentrating (brain fog)	11	13.10
Hair loss	10	11.90
Newly diagnosed diabetes	1	1.19
None of the above	34	40.48

exhaustion, cognitive dysfunction, depression, and other symptoms after a minimal amount of activity.⁹ Fatigue is the most common symptom of PCS, the incidence ranging from 16–72%, and it lasted for more than seven months in some studies. Additionally, it has a predilection for male gender and for individuals having diabetes and hypertension as comorbidities.¹⁰ Our study is comparable to this data as fatigue was the commonest symptom experienced by participants in our study, e.g., 42 (50%), it also affirms the finding that the patients with hypertension have more Odds of having fatigue as post-COVID sequel ($P = 0.001$). Although the precise pathophysiology of the chronic fatigue in these patients is still being investigated, it is hypothesized that the pro-inflammatory cytokines such as interferon-gamma and interleukins are released following the viral infection, which cross the blood-brain barrier and affect the central nervous system (CNS) organs such as the hypothalamus.¹¹ The autonomic involvement of hypothalamus results in cognitive abnormality, sleep/wake cycle dysregulation, fatigue and myalgia favoring chronic fatigue syndrome.⁹

The presence of PCS has shown a positive relationship with the severity of disease, hospitalization and need for oxygen requirement; although the intensity of fever has not shown any causal relationship with PCS. Low grade or high-grade fever during acute COVID has similar chances of having PCS which is also documented by other published data.¹

Hair loss is another finding which increases the morbidity associated with this pandemic. Our study has demonstrated 11 (13%) patients who suffered from severe hair loss, resulting in emotional stress in the already vulnerable post-COVID population. This finding is consistent with the diagnosis of telogen effluvium, which is characterized by diffuse hair loss within months of a significant systemic stressor, because of premature follicular transition from the anagen (active growth phase) to the telogen (resting phase). The telogen phase lasts approximately 3 months, after which excessive hair loss ensues.¹² In individuals who suffered from COVID-19, the intense psychological pressure and massive inflammatory response are plausible triggers for acute/chronic telogen effluvium.¹³ Provision of proper reassurance and education about this physically and emotionally distressing post-COVID dermatologic manifestation is mandatory.

In our study 23 (28%) patients with PCS needed some treatment for their symptoms, whereas in 61(72%), the symptoms weaned off gradually over a period of 2 to 6 months. Two patients suffered from fever ranging from 99–102° F approximately one month after the illness which persisted for 10–14 days, with a high C-reactive protein and no clinical or laboratory evidence of any systemic infection, the fever subsided with colchicine which was continued for 2 weeks. C-reactive protein also returned to normal. Colchicine was chosen in our study as evidence based with the rationale that it has inhibitory effects on neutrophil activity, cytokine generation and the inflammation / thrombosis interface. Most importantly no evidence of systemic immunosuppression has been associated with its use which can increase the risk of a secondary infection.^{14, 15} Although the data on use of colchicine in COVID-19 infected patients in OPD setting is sparse but it has shown a significant mortality benefit

and less need of supplemental oxygen at day 7 in hospital setting in the published data.¹⁴

Cognitive impairment occurs relatively often, within several months of patients having had COVID-19, according to the results of a cross-sectional study published by Becker.¹⁶ He has also raised concern that SARS-CoV-2 poses an increased risk for neurodegenerative diseases. In our study, 11 (13%) patients suffered from reduced concentration power (brain fog) and 13 (15%) of our patients were unable to perform the daily activities secondary to fatigue and decrease in concentration.

Table 3: ODD's Ratio of Post COVID Syndrome in relation to different variables

Risk Factors	Odds Ratio (95% CI)	
Gender (Male/Female)	0.801	(0.333 - 1.928)
Age Groups(years)		
21 - 40 years	2.370	(0.923 - 6.086)
41 – 60years	0.703	(0.282 - 1.756)
61 – 80years	0.550	(0.206 - 1.472)
Association with COVID vaccination	0.650	(0.219 - 1.924)
Wave - Infected with COVID		
First Wave (Apr 2020- Aug 2020)	1.143	(0.398 - 3.286)
Second Wave (Oct 2020 - Feb 2021)	0.495	(0.203 - 1.205)
Third Wave (Mar 2021-Jun 2021)	1.768	(0.505 - 6.192)
Fourth Wave (from Jul 2021 onwards)	1.768	(0.505 - 6.192)
Comorbid		
Hypertension	6.857	(0.826 - 56.931)
Diabetes Mellitus	0.625	(0.118 - 3.300)
Depression	2.723	(0.291 - 25.502)
Hypertension and Diabetes Mellitus	0.625	(0.118 - 3.300)
None of the above	0.539	(0.203 - 1.433)
Severity of COVID		
Mild	0.583	(0.241 - 1.411)
Moderate	1.368	(0.562 - 3.326)
Severe	2.067	(0.391 - 10.917)
Need for Hospitalization	1.182	(0.432 - 3.234)
Need for Oxygen	1.153	(0.310 - 4.296)
Intensity of Fever (°F)		
Afebrile	0.125	(0.032 - 0.493)
99-100°F	3.051	(1.122 - 8.297)
101-102°F	0.806	(0.330 - 1.970)
103-104°F	4.267	(0.490 - 37.181)

Post–COVID symptoms were experienced by a large majority of patients in this study and although the symptoms were mild but were sufficient to jeopardize the quality of life in the affected individuals. Morbidity includes reduced working capacity secondary to increased fatigability and brain fog which persist till 3–4 months.

5. Limitations

Our sample size was small and cannot be generalized to the entire population although it is comparable with studies in different settings. Observational studies for longer duration are needed to follow the symptoms and minimize the disease burden associated with persistent or long term morbidity among individuals of all ages.

6. Recommendations

Early identification of post–COVID patients regardless of age and COVID–19 severity is crucial for the management and appropriate resource allocation to ensure reversibility and potential opportunities for interventions, such as cognitive rehabilitation. A close follow up will ensure unidentified patients with pyrexia as post–COVID sequel which is not to be dealt with the conventional methods.

7. Conclusion

The prevalence of post–COVID symptoms in the infected population is high, resulting in persistent and variable morbidity in post–COVID patients; however, no identifiable definitive risk factor is observed. Large-scale, observational studies are needed for a prolonged follow-up of the sequelae of this comparatively new virus which may still be unidentified.

8. Acknowledgments

We are thankful to Mr. Muhammad Azher Uddin for his guidance and contribution in statistical analysis of this study. We are also thankful to all of the participants for their time to complete this survey.

9. Conflicts of Interest

None declared by the authors. No funding was involved in this study.

10. Authors' contribution

SSK: Conceived the idea, Literature review, manuscript writing, critical analysis and revision

FZ: Data analysis, manuscript writing

MU: Collecting sample and literature review

AA: Interpretation of the data, drafting of the manuscript

ZAR: Critical analysis and manuscript revision

RAS: Revising and editing the manuscript

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