

## Assessment of post-COVID-19 clinical manifestations after recovery in healthcare professionals

Post COVID-19 clinical manifestations

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### Abstract

**Aim:** In this study, we aimed to assess the COVID -19 clinical manifestations after recovery from illness among healthcare professionals.

**Material and Methods:** After ethical approval, a structured questionnaire has been distributed among healthcare professionals who were willing to participate in the study. The questionnaire contained forty questions, which were divided into four sections.

**Results:** A total of 126 participants completely filled the questionnaire, including 65 (51.6%) females and 61(48.4%) males. Fatigability is the most common (38.1%) post-COVID clinical manifestation in healthcare professionals. Other common post- COVID clinical manifestations are numbness in the face/ arms/ legs (34.2%), cough (23%), muscle pain (20.6%) and anxiety/depression (20.6%) in order of frequency.

**Discussion:** The presence of fatigue, anxiety, cough and hair fall was observed in women healthcare workers up to 2 months even after recovery from mild to moderate disease.

### Keywords

COVID-19, Clinical Manifestations, Health Professionals

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## Introduction

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the worldwide pathogen, caused coronavirus disease 2019 (COVID-19), has impulse morbidity and mortality at prodigious scale [1]. Patients suffered divergent symptoms like fever, dry cough, and fatigue. About 80% of cases showed mild manifestation, but severe cases may progress, causing respiratory distress or respiratory failure that increased the need for intensive care unit (ICU) [2]. Respiratory manifestations may also coexist with hematological, olfactory, renal, gastrointestinal, hepatic, cardiac, neurological, cutaneous and gustatory symptoms [3]. Diagnosis of COVID-19 is done through polymer chain reaction (PCR), computed tomography (CT) scan, and blood test [4]. While acute symptoms were predominant during coronavirus disease 2019 (COVID-19) and most of the patients completely recovered, although fraction of patients experiencing long-term health consequences is now increasing [5]. COVID-19 associated ailments sustain beyond three weeks after the onset of symptoms and chronic COVID-19 manifestations extending more than 12 weeks after the emergence of symptoms are defined as post-COVID syndrome (PCS). Post-COVID syndrome was first time defined by Greenhalgh et al [6]. Communal post-COVID traits include fatigue, dyspnea, olfactory and gustatory dysfunction, chest pain, myalgia, and sleep and mental disorders [7, 8]. Individuals may experience symptoms for several months that disrupt the work activity and quality of life [6]. PCS complete clinical picture is complex and far from being understood. However, viral tropism is defined by the entry into cells through a widely expressed ACE2 receptor, making it a potential threat of damage to many organs either in acute or chronic form [5]. Leading pathophysiologic methods of COVID-19 include the following: direct viral toxicity; endothelial damage and microvascular damage; immune system dysregulation and hyperinflammatory regeneration; hypercoagulability leading to situ thrombosis and macro thrombosis [9]. The objective of this study is to investigate the post-COVID-19 manifestation after recovery from illness and to mitigate the long-term medical effects of COVID-19 and the duration of symptoms in healthcare professionals.

## Material and Methods

Following ethical approval from the institutional research committee, a structured questionnaire has been designed for the collection of data from the recovered cases of COVID-19 regarding the post-COVID-19 clinical manifestations. The questionnaire consists of 40 questions, which are subdivided into four sections. The first section covers the socio-demographic data of the participants, such as age, gender and educational level. The second section contains of 8 questions regarding comorbidities. The third section is comprised of 8 questions about the symptoms experienced during the COVID-19 disease, while the section four contains of 20 questions that are related to post-COVID-19 clinical manifestations.

After the approval of this research project by the institutional ethical & review board, the questionnaire has been distributed among those health care professionals who have recovered from COVID-19 and are willing to participate in this research

project. This study has been conducted in November 2021. No personal identification such as name, phone number or email address has been collected. The analysis of the completely filled questionnaire was carried out using a computer software.

## Results

During the study period, a total of 126 participants completely filled the questionnaire, which included 65 (51.6%) females and 61 (48.4%) males. Participants were divided into six groups according to their age. In group one, the age ranged from 18 to 25 years, and the majority of the participant belonged to this group, which comprised 71 (56.3%) of the total study participants of 126 (100%). The second age group (26 – 35 years) included 20 (15.9%) participants, while other groups 46–55 years = 16 (12.7%), 36–45 years = 10 (7.9%), 56–65 years = 8 (6.3%) and more than 65 years = 1 (0.8%) in order of frequency, respectively. The majority of the participants (68 (54.1%)) were undergraduate students, while 40 (31.7%) medical professionals had post-graduate degrees. The remaining categories included 10 (7.9%) graduates and 8 (6.3%) post-graduate students. Among the participants of this research project, the majority had no comorbidity 91 (72.2%), while 18 (14.3%) of the participants had hypertension, 8 (6.3%) had diabetes mellitus, and 8 (6.3%) had asthma. Six (4.8%) participants had chronic joint disorder, while 5 (4%) had cardiovascular disease, and one person (0.8%) had chronic kidney disease.

During the COVID-19 disease, the study participants experienced the following symptoms, in the order of frequency: fever 102 (81%), fatigue 97 (77%), headache 69 (54.8%), loss of taste 59 (46.8%), loss of smell 51 (40.5%), shortness of breath 43 (34.1%) and insomnia 31 (24.6%), while 8 persons (6.3%) did not develop any symptoms. Details of post-COVID-19 clinical manifestations are shown in Table 1.

## Discussion

Pakistan has been hit by COVID-19 although the number of patients recovering from COVID-19 is increasing daily. Post-recovery manifestations and long-lasting symptoms are not well written in the literature [10]. This study primarily focused on the prognosis of COVID-19 and the impact of the current epidemic on healthcare professionals. Moreover, we aimed to establish a relationship between post-COVID syndrome and the age of individuals requiring long-term support. We observed that 72.3% (91/126) with mild to moderate disease were found to have long-term health consequences after two months, defined by the presence of at least one symptom (fatigue, insomnia, breathlessness) after mild disease. These symptoms can be called post-COVID-19 Syndrome as they are related to SARS-CoV2 infection [11].

Our study demonstrates that there is a range of symptoms that persisted beyond the phase of illness due to COVID-19, out of which nonspecific symptoms were predominantly referred to as post COVID syndrome. In this study, 48 people out of 72.3 experienced fatigue and peripheral neuropathy 43 out of 126 participants, majority of them were females of the younger age group (18–25) without any comorbidity. Fatigue has previously been reported as one of the most common symptoms of PCS [12]. The possible physical link to fatigue may be endothelial

**Table 1.** Post-COVID-19 Clinical Manifestations

Clinical manifestation	Total 126		Age								Gender			
			18-25 Y		26-35 Y		36-45 Y		>45 Y		Males		Female	
	-100%		71 (100%)		20 (100%)		9 (100%)		26 (100%)		61 (100%)		65 (100%)	
	N	%	n	%	n	%	n	%	n	%	n	%	n	%
Cough	29	23.02	16	22.54	6	30	1	11.11	6	23.08	18	29.51	11	16.92
Fatigue	48	38.10	19	26.76	11	55	7	77.78	5	19.23	23	37.70	25	38.46
Headache	17	13.49	4	5.63	4	20	2	22.22	1	3.85	4	6.56	13	20.00
Fever	7	5.56	6	8.45	-	0	0	0.00	1	3.85	1	1.64	6	9.23
Hair fall	23	18.25	12	16.90	3	15	1	11.11	7	26.92	5	8.20	18	27.69
Sore throat	10	7.94	8	11.27	1	5	0	0.00	1	3.85	3	4.92	7	10.77
Joint Pain	16	12.70	8	11.27	5	25	1	11.11	2	7.69	5	8.20	11	16.92
Muscle Pain	26	20.63	10	14.08	-	0	4	44.44	8	30.77		0.00	26	40.00
Chest Tightens	12	9.52	9	12.68	3	15	1	11.11	4	15.38	10	16.39	2	3.08
Insomnia	8	6.35	6	8.45	-	0	0	0.00	2	7.69	2	3.28	6	9.23
Anxiety/depression	26	20.63	16	22.54	4	20	2	22.22	4	15.38	8	13.11	18	27.69
Loss of taste	13	10.32	7	9.86	2	10	0	0.00	4	15.38	6	9.84	7	10.77
Palpitation	13	10.32	4	5.63	1	5	4	44.44	4	15.38	5	8.20	8	12.31
Loss of smell	18	14.29	10	14.08	2	10	3	33.33	3	11.54	9	14.75	6	9.23
Nausea	4	3.17	3	4.23	0	0	0	0	1	3.85	2	3.28	2	3.08
Vomiting	2	1.59	0	0.00	0	0	0	0	2	7.69	0	0	2	3.08
Blurred Vision	8	6.35	4	5.63	1	5	1	11.11	2	7.69	1	1.64	7	10.77
Decreased appetite	18	14.29	12	16.90	5	25	1	11.11	0	0.00	11	18.03	7	10.77
Increased appetite	18	14.29	10	14.08	2	10	3	33.33	3	11.54	11	18.03	7	10.77
Numbness in the face/ arms/legs	43	34.13	29	40.85	6	30	2	22.22	6	23.08	16	26.23	27	41.54
No symptom	35	27.78	27	38.03	1	5	2	22.22	5	19.23	20	32.79	15	23.08

dysfunction in the capillaries of the brain recently described in Nauen et al [13]. According to data published by Townsend et al., we noted that even patients with mild illness may initially develop fatigue as a leading symptom of PCS [12]. In accordance with the previously published data, our results show that women are more likely to be affected by PCS [14].

In addition, peripheral neuropathy was observed in female participants of younger age group about 41%. Factors contributing to the neuropathology of COVID-19 can be categorized as direct infection, severe systemic inflammation, neuroinflammation, microvascular thrombosis and neurodegeneration [15]. A series of autopsies have shown that SARS-CoV-2 can cause changes in the parenchyma of the brain and blood vessels, possibly due to the effects on blood-brain and barriers to cerebrospinal fluid, which cause inflammation in neurons, supporting cells and vasculature of the brain [16]. Cerebral injury biomarkers, such as raised peripheral blood levels of neurofilament light chain, have been seen in patients with COVID-19 [17].

After recovery, our participants also reported other symptoms like anxiety, muscle pain, and some dermatological manifestations i.e. hair loss. Significantly more females developed post-COVID-19 hair loss, anxiety, depression, and fatigue when compared to male participants ( $p < 0.05$ ). The pathophysiology of post-COVID syndrome is poorly understood, hyper inflammatory condition, oxidative stress, cytokine storm, and DNA damage have been thoughtful but ongoing research is needed to guide potential therapies [18]. Cough was the persistent respiratory symptom expected in post-COVID syndrome seen in male participants. Previous outbreaks of SARS-CoV have demonstrated consistent respiratory symptoms,

limiting pattern of pulmonary function metrics associated with muscle weakness in six to eight weeks following discharge from hospital [19]. Hair loss may be caused by telogen effluvium as a result of viral infection or a stress response [20]. Biotin supplementation and 5% Minoxidil are recommended for hair loss beyond six to nine months [10]. Our study suggested that post-COVID 19 manifestations can be seen in mild or moderate disease even in the younger age group.

Taken together we suggest that SARS-CoV-19 symptoms are more frequent in females and PCS can occur in younger healthcare workers despite mild to moderate disease. Efficient methods of physical rehabilitation and surveillance programs are required for healthcare professionals to improve the well-being of frontline workers. Moreover, recovered people should be highly observant about future complications.

**Conclusion:**

Female healthcare workers of the younger age group showed a high prevalence of post-COVID syndrome after a mild to moderate course of the ailment. Younger participants are long-haulers, whereas elderly subjects have a higher risk of getting serve disease. Moreover, healthcare workers should validate the need for a systemic evaluation, physical and mental rehabilitation.

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**Scientific Responsibility Statement**

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

**Animal and human rights statement**

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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**Conflict of interest**

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