

## Persistence of respiratory symptoms among COVID-19 survivors

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### Article Info

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### Abstract

This cross-sectional observational study was conducted among COVID-19 patients at Department of Respiratory Medicine, Bangabandhu Sheikh Mujib Medical University from July 2020 to December 2020. During follow-up around three months ( $90.62 \pm 2.21$  days) after the onset of the first COVID-19 symptoms, 500 patients were taken as the study sample. Our study aimed to assess the persistent symptoms in patients who were discharged from the hospital after recovery from COVID-19. This study has shown that persistent respiratory symptoms were common after COVID-19 and the majority of patients were symptom-free three months after COVID-19 onset.

### Introduction

Coronavirus Disease 2019 (COVID-19) is a new and highly contagious respiratory disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which presented a risk of infection from human to human.<sup>1</sup> At the end of 2019, a novel coronavirus was identified as the cause of a cluster of pneumonia cases in Wuhan, a city in the Hubei Province of China. It rapidly spread, resulting in an epidemic throughout China, followed by an increasing number of cases in other countries throughout the world. In February 2020, the World Health Organization designated the disease COVID-19, which stands for coronavirus disease 2019. In Bangladesh, the first three known cases were reported on 8th March 2020 by the country's epidemiology institute, IEDCR. The spectrum of symptomatic infection ranges from mild to critical; most infections are not severe.<sup>2</sup> After SARS-CoV-2 infection, a major complication of those who survived to COVID-19 outbreak is the development of severe lung disease leading to persistent respiratory symptoms.<sup>3</sup> Persistent impairment of pulmonary function after discharge ranging from months to even years has been reported in other coronavirus infections such as severe acute respiratory syndrome (SARS) and the Middle East respiratory syndrome (MERS).<sup>4,5</sup> Recent

evidence has suggested that lung is the most affected organ by COVID-19.<sup>6</sup> The extent and severity of the long term respiratory complications of COVID-19 infection remain to be seen, but emerging data indicate that many patients experience persistent respiratory symptoms months after their initial illness.<sup>7</sup> Persistent respiratory symptoms following COVID-19 may cause substantial population morbidity, and optimal management remains unclear. Prospective studies are under way to evaluate these complications further and to identify people at greatest risk.

### Materials and Methods

This was a Cross-Sectional observational study of the patients, who were recovered from acute COVID-19. Follow-up was conducted at the Department of Respiratory Medicine, Bangabandhu Sheikh Mujib Medical University, Dhaka July 2020 to December 2020. All patients admitted in the COVID-19 ward, who were laboratory-confirmed SARS-CoV-2 infection by real-time reverse transcription polymerase chain reaction (RT-PCR) with respiratory symptoms were considered for this study. All patients who met the inclusion criteria (laboratory-confirmed SARS-CoV-2 infection by RT-PCR with the presence of respiratory symptoms,

age more than 18 years) and exclusion criteria (patients having history of pre-existing lung diseases like asthma, COPD, interstitial lung disease, bronchiectasis, obstructed sleep apnea, and history of pulmonary resection, neurological disease or mental illness) and World Health Organization criteria for discontinuation of quarantine were followed up. After discharge from the hospital, we kept their records. Patients were assessed around three months ( $90.62 \pm 2.21$  days) after the onset of the first COVID-19 symptoms. In particular, data on specific respiratory symptoms potentially correlate with COVID-19 were obtained using a standardized questionnaire administered at enrollment. Patients were asked or requested to attend the post-COVID clinic three months from the onset of their first symptoms. Then data was collected with a structured questionnaire. The visual analog scale (VAS) was used to ask patients to score their quality of life from 0 (no symptoms) to 100 (worst symptoms imaginable) before COVID-19 and at the time of the visit. Total 590 confirmed COVID-19 patients were primarily screened for the study. During follow-up around three months after the onset of the first COVID-19 symptoms, 33 died and 57 patients were unwilling to participate. Following then 500 patients were taken as the study sample. After collecting the data it was checked and re-checked for omission, inconsistencies and improbabilities. Means and standard deviations (SD) were used to summarize continuous variables, while percentages were used for categorical variables. Data analysis was performed by Statistical Package for Social Science (SPSS), version-25.

## Results

During follow-up around three months ( $90.62 \pm 2.21$  days) after the onset of the first COVID-19 symptoms, among 500 patients the mean age of the participants was  $52.69 \pm 12.81$  years, range 18-80 years. Maximum patients 132 (26.4 %) were over 60 years of age. Only 50 (10.0%) patients were under 30 years and the maximum number of patients 334 (66.80%) were male and the rest 166 (33.20%) patients were female. Figure-1 shows the median number of respiratory symptoms during the infection reduced significantly over time (90 days later). Cough and shortness of breath were the most prevalent respiratory symptoms during the infection and at follow-up (cough: 88.4% versus 26.8%; shortness of breath: 58.6% versus 22.6%) respectively. Other prevalent respiratory symptoms were during the infection and follow-up (sore throat: 22.6% versus 1.8%, sputum production: 11.4% versus 2.2%, anosmia: 30.8% versus 2.0%, chest pain: 15.4% versus 5.6%, rhinitis: 31.2% versus 2.0%), respectively. Table-I shows majority of COVID-19 patients 300 (60.0%) were symptoms free during follow-up (three months later), and 40.0% had persistent respiratory symptoms. In Table-II multivariate logistic regression analysis revealed that severity of COVID-19 during

infection was independently and significantly ( $p < 0.05$ ) associated with the persistent respiratory symptoms, having OR = 1.72 (95% CI 1.442-1.558).

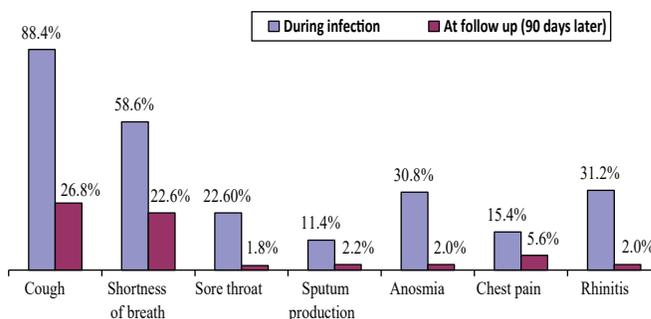


Figure-1: Bar graph showing the prevalence of respiratory symptoms during the infection and at follow-up (90 days later) of the study patients (n=500)

Table-I

### Frequency of respiratory symptoms among COVID-19 survivors during follow-up (three months later)

Respiratory symptoms	Number	Percentage
Symptoms present	200	40.0 %
Symptoms absent	300	60.0%
Total	500	100.0%

Table-II

### Multivariate logistic regression analysis of risk factors associated with the persistent respiratory symptoms

Parameters	OR	95% CI Lower-Upper	P value
Age >60 years	0.25	1.664-1.786	0.64
Overweight	0.029	1.466-1.604	0.91
DM	1.29	1.516-1.654	0.39
Cardiovascular disease	0.29	1.905-1.975	0.56
Ground-glass opacity	0.39	1.168-1.282	0.75
Severity of COVID-19	1.72	1.422-1.558	<0.001

## Discussion

In the present study maximum patients were found in the sixth and seventh decades for both males and females. The mean age of the participants was  $52.69 \pm 12.81$  years, range

18-80 years. Among the study population, the maximum number of patients was male. Zhou, et al. conducted a cohort study of laboratory-confirmed admitted COVID-19 patients, their median age was 56.0 years and most patients were male.<sup>8</sup> Our demographic findings, matched with this study. In the present study, we found the median number of respiratory symptoms during the infection reduced significantly over time (three months later). Cough and shortness of breath were the most prevalent respiratory symptoms during the infection and at follow-up. Other less frequent respiratory symptoms during the infection and follow-up were sore throat, sputum production, anosmia, chest pain, and rhinosinusitis. Goërtz, et al. conducted an observational study that showed fatigue and dyspnoea were the most prevalent symptoms during the infection and at follow-up.<sup>9</sup> Other prevalent respiratory symptoms were cough, sore throat, anosmia, sneezing, and chest tightness. In our study, during follow-up majority was completely free of COVID-19 related respiratory symptoms. In another study conducted by Carfi, et al., patients have assessed a mean of 60.3 (SD, 13.6) days after onset of the first COVID-19 symptoms.<sup>3</sup> All these results were quite similar to our result. In this study, we observed that there was no significant association of age, sex, co-morbidities and HRCT scan of chest with the persistent respiratory symptoms of COVID-19 survivors. But significant association was found between severity of COVID-19 and persistent respiratory symptoms. In multivariate logistic regression analysis also revealed that severity of COVID-19 during infection was independently and significantly associated with the persistent respiratory symptoms. These findings were similar to the observation done by Liu, et al. and Mowla, et al.<sup>10,11</sup>

## Conclusion

This study has shown that persistent respiratory symptoms were common after COVID-19 and were related to age, sex, the severity of COVID-19, HRCT scan of chest and the number of co-morbidities present during the acute phase. The majority of patients were symptom-free three months after COVID-19 onset. Identification of persistent symptoms requiring early intervention is critical to plan for and providing post-acute medical, psychological, and physical services to enable recovery from COVID-19 infection, including the ability to return to work.

## Funding

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## Ethical Issue

The protocol for this study was approved by the Institutional Review Board of Bangabandhu Sheikh Mujib Medical University

## Conflict of Interest

Authors declare no conflict of interest

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