Decrease in Health-Related Quality of Life and Post–COVID-19 Syndrome in Health Care Workers After SARS-CoV-2 Infection

A Cohort Study

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Objectives: The aim of this study is to assess the persistence of symptoms, the prevalence of post–COVID-19 syndrome, and the health-related quality of life (HRQOL) among health care workers (HCWs) 6 months after severe acute respiratory syndrome coronavirus 2 infection. **Methods:** A prospective cohort study was conducted. All HCWs with confirmed COVID-19 from January to June 2021 were invited to participate. Health-related quality of life was evaluated in three moments: before COVID-19, after COVID-19 (on return to work), and after 6 months. Persistence of symptoms post–COVID-19 was also assessed. **Results:** There was a worsening in all dimensions of HRQOL. After 6 months, self-rated health on EuroQol visual analog scale did not return to pre–COVID-19 values. At total, 36.2% of HCWs were diagnosed with post–COVID-19 syndrome. **Conclusions:** There was a significant deterioration in HRQOL among HCWs who had COVID-19 and a high frequency of post–COVID-19 syndrome.

Keywords: quality of life, COVID-19, post–COVID-19 cases, health care workers, health-related quality of life

Since December 2019, coronavirus disease 2019 (COVID-19) has spread rapidly worldwide. The spectrum of acute symptomatic severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection ranges from mild to critical.[1] However, the long-term health effects of COVID-19 are largely unknown. A large variety of physical, cognitive, and/or mental health impairments have been described. Some survivors report persistent symptoms such as fatigue, dyspnea, sleep disorders, anxiety, and depression.[2–6] Huang et al[7] showed that the most common symptoms at 6 months after acute infection were fatigue or muscle weakness in 63% of patients and sleep difficulties in 26%. The incidence of post–COVID-19 syndrome in outpatients is between 10% and 35%, reaching almost 85% in those hospitalized.[8] In addition, a large proportion of patients report impairments in major dimensions of health-related quality of life (HRQOL) after COVID-19.[5,9–14]

Health care workers (HCWs) are at a higher risk of exposure to SARS-CoV-2 and can be vectors of the disease, transmitting it to patients and accelerating its spread.[15] Considering that COVID-19 prevalence among HCWs varies between 7% and 11%,[16,17] it is important to assess long-term effects after the acute phase. Therefore, the aim of this study is to assess the persistence of symptoms, the prevalence of post–COVID-19 syndrome, and the HRQOL among HCWs 6 months after SARS-CoV-2 infection.

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METHODS

Study Design and Location

We conducted a prospective cohort study in a general, tertiary care, university-affiliated hospital. The study was approved by the Ethics Committee of Hospital de Clínicas de Porto Alegre on September 14, 2020 (number 200459). All participants signed an informed consent form before inclusion in the study.

Patients

All HCWs with confirmed COVID-19 during the period from January to June 2021 were invited to participate in the study. We considered a confirmed case of COVID-19 if reverse transcription polymerase chain reaction test for SARS-CoV-2 infection was detected. Those HCWs who did not want to participate in the study were excluded.

Data Collection

Enrolled subjects were interviewed after COVID-19 (on return to work) and in 6 months using a standardized questionnaire. The following data were collected: demographic data (sex, age), persistence of symptoms post–COVID-19, and HRQOL data. Health-related quality of life was evaluated in three moments: before COVID-19, after COVID-19 (on return to work), and after 6 months. As quality-of-life data are not routinely collected from HCWs in the hospital, we asked HCWs to complete the HRQOL questionnaire (before COVID-19) based on their pre–COVID-19 health. Post–COVID-19 syndrome was defined by symptoms that continue for more than 12 weeks, not explained by an alternative diagnosis.

To assess quality of life, the EuroQol-5D scale (EQ-5D) and the EuroQol visual analog scale were used. The EQ-5D defines health through five dimensions, namely, mobility, personal care, usual activities, pain/discomfort, and anxiety/depression.[18] Each dimension is divided into three severity levels, and together, they define 243 distinct health states, each of which is labeled with a unique five-digit code; for example, 11,111 represents full health status defined as having no problems in any dimension, whereas 33,333 represents the worst health status with extreme problems in all five dimensions. The EQ-5D Portuguese version was validated by Ferreira et al.[19] The EuroQol visual analog scale was used to question patients about their quality of life, from 0 (worst imaginable health) to 100 (best imaginable health), before COVID-19, after COVID-19 (on return to work), and in 6 months. A 10-point difference between two assessments was used to define worsening of quality of life.

Statistical Analyses

Data analysis was performed using SPSS 18.0 (Statistical Package for the Social Sciences, Chicago, IL). Data were presented as number of cases, mean ± standard deviation, or median with interquartile range (IQR). Categorical comparisons were performed by Pearson's chi-squared test. Continuous variables were compared using analysis

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of variance. A two-sided P value < 0.05 was considered significant for all analyses.

To calculate the sample size, a previous study with patients with COVID-19 was used.[20] In this study, the visual analog scale EuroQol score was 77 pre–COVID-19 and 65.8 after 6 months. Thus, considering an α error of 5% and a study power of 80%, it would be necessary to include at least 39 patients.

RESULTS

During the study period, 641 HCWs tested positive for SARS-CoV-2 infection; 289 accepted to participate and were included in the study. All study participants had COVID-19 only once (during the study period). These HCWs were evaluated regarding HRQOL before and after COVID-19 (on return to work). After 6 months, the same HCWs were contacted by phone to have their quality of life evaluated again; at this moment, 174 HCWs agreed to participate. Among the 289 HCWs, the mean age was 42.2 ± 9.5 years, and 56 (19%) were male.

Table 1 shows the results of EQ-5D scale and the EuroQol visual analog scale. The dimensions most affected before COVID-19 were anxiety/depression (40.8% moderately or extremely anxious or depressed) and pain/discomfort (33.6% with moderate or extreme pain or discomfort). A statistically significant worsening was observed in all dimensions of the scale after COVID-19 (on return to work). Self-rated health on EuroQol visual analog scale revealed a median score of 90 (IQR, 80 to 95) before COVID-19, 80 (IQR, 70 to 90) after COVID-19 (on return to work), and 87.5 (IQR, 80 to 90) after 6 months ($P < 0.0001$).

Sixty-three of 174 HCWs (36.2%) were diagnosed with post–COVID-19 syndrome. The most frequent persistent symptoms were as follows: fatigue (23/63, 36.5%), sleep disturbances (9/63, 14.3%), dyspnea (8/63, 12.7%), and cough (6/63, 9.5%). Among patients who had reduced quality of life at 6 months (n = 85), 63 (74.1%) were due to post-COVID syndrome.

DISCUSSION

In this study, we found a statistically significant worsening in all dimensions of HRQOL among HCWs after COVID-19. After 6 months of acute disease, self-rated health on EuroQol visual analog scale did not return to pre–COVID-19 values. Among HCWs who had reduced HRQOL at 6 months, 74.1% had post–COVID-19 syndrome. At total, 36.2% of HCWs were diagnosed with post–COVID-19 syndrome, and the most common persistent symptoms were fatigue, sleep disturbances, dyspnea, and cough.

To our knowledge, this is the first study that measured HRQOL before and after COVID-19 among HCWs. Reductions in HRQOL have been demonstrated among patients in general.[6,9,12,14] Wong et al[9] showed at least moderate impairments in quality of life in 33% of patients. Health-related quality of life lower than the healthy population was found 3 months after discharge.[14] In another study,[12] 25% of patients had reductions in physical and mental global health after a median of 7.8 months of follow-up. Even nearly 1 year after acute SARS-CoV-2 infection, one third of patients still have reduced HRQOL.[6]

We found a median EuroQol visual analog scale score of 80 after COVID-19. This score is similar to previous studies in China[7] and Denmark.[13] The dimensions of anxiety/depression, pain and discomfort, and usual activities were the most affected in this study. Daher et al[11] described reduced HRQOL, with mobility being the mainly changed dimension. Pain and discomfort, usual activities, and mobility were the most altered dimensions in other investigations. We observed that before having acute SARS-CoV-2 infection, more than 40% of HCWs already reported anxiety/depression. Indeed, it has already been demonstrated that the COVID-19 pandemic influences the quality of life of HCWs who are on the front lines of caring for COVID-19 patients, with a high prevalence of depression and anxiety.[21,22]

The reduction in HRQOL after COVID-19 can be largely explained by the persistence of symptoms and post–COVID-19 syndrome. Although COVID-19 predominantly affects the lungs, it can also damage many other organs, including the heart, kidneys, and brain.[23,24] A recent systematic review and meta-analysis demonstrated that 80% of patients had post–COVID-19 sequelae, and the most frequent residual symptoms were fatigue (58%) and dyspnea (24%).[4] In accordance with our findings, studies have shown that dyspnea and/or fatigue may persist for months after discharge.[2,3] Hellemons et al[5] demonstrated a prevalence of dyspnea of 68% in 2 months and 36% after 3 months. Fatigue

TABLE 1. EuroQol-5D Scale and EuroQol Visual Analog Scale Results

	Before COVID-19	After COVID-19 (on Return to Work)	After COVID-19 (6 mo)	*P* Value
Mobility				
I have no problems to walk about	277 (95.8)	250 (86.5)	165 (94.8)	<0.0001*
I have some problems in walking about	12 (4.2)	39 (13.5)	9 (5.2)	
I am confined to bed	0	0	0	
Self-care				
I have no problems with self-care	287 (99.3)	278 (96.2)	171 (98.3)	0.032*
I have some problems washing or dressing myself	2 (0.7)	11 (3.8)	3 (1.7)	
I am unable to wash or dress myself	0	0	0	
Usual activities†				
I have no problems with performing my usual activities	273 (94.5)	218 (75.4)	149 (85.6)	<0.0001*
I have some problems with performing my usual activities	16 (5.5)	71 (24.6)	25 (14.4)	
I am unable to perform my usual activities	0	0	0	
Pain/discomfort				
I have no pain or discomfort	192 (66.4)	152 (52.6)	115 (66.1)	0.005*
I have moderate pain or discomfort	95 (32.9)	132 (45.7)	58 (33.3)	
I have extreme pain or discomfort	2 (0.7)	5 (1.7)	1 (0.6)	
Anxiety/depression				
I am not anxious or depressed	171 (59.2)	131 (45.3)	95 (54.6)	0.020*
I am moderately anxious or depressed	113 (39.1)	150 (51.9)	76 (43.7)	
I am extremely anxious or depressed	5 (1.7)	8 (2.8)	3 (1.7)	
EuroQol visual analog scale, median (interquartile range)	90 (80–95)	80 (70–90)	87.5 (80–90)	<0.0001‡

*P for the difference between before and after COVID-19 (on return to work).

†For example, work, study, housework, family, or leisure activities.

‡P for the difference between the three moments.

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may persist up to 6 months after acute disease, with an important impact in HRQOL.[5] In fact, nearly 1 year after COVID-19, two thirds of patients still referred at least one residual symptom.[6]

This study has some limitations. First, it was carried out in a single tertiary university hospital; however, we do not think that this is a limitation for generalizing the results. Second, we did not use a control group, which precludes comparison of HRQOL with those who did not suffer from COVID-19. Last, measurement bias cannot be ruled out because participants were asked to rate their quality of life before COVID-19 on return to work. On the other hand, this is the first study that evaluated HRQOL before and after COVID-19 among HCWs and also brings evidence of high prevalence of post–COVID-19 syndrome in these patients.

In conclusion, our study showed a significant deterioration in HRQOL among HCWs who had COVID-19. We demonstrated also a high frequency of post–COVID-19 syndrome at 6 months after COVID-19. Our results highlight the need for a long-term follow-up of HCWs after SARS-CoV-2 infection.

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