


Post-COVID syndrome: A single-center questionnaire study on 1007 participants recovered from COVID-19

Bircan Kayaaslan¹ | Fatma Eser¹ | Ayse K. Kalem¹ | Gamze Kaya² |
Betul Kaplan² | Duygu Kacar² | Imran Hasanoglu¹  | Belgin Coskun² |
Rahmet Guner¹

¹Department of Infectious Disease and Clinical Microbiology, Ankara City Hospital, Ankara Yildirim Beyazit University, Ankara, Turkey

²Department of Infectious Disease and Clinical Microbiology, Ankara City Hospital, Ankara, Turkey

Correspondence

Bircan Kayaaslan, Infectious Disease and Clinical Microbiology, Ankara Yildirim Beyazit University, Ankara City Hospital, Bilkent St no:1, Ankara 06800, Turkey.
Email: drbican@gmail.com and bkayaaslan@ybu.edu.tr

Abstract

Post recovery manifestations have become another concern in patients who have recovered from coronavirus disease 2019 (COVID-19). Numerous reports have shown that COVID-19 has a variety of long-term effects on almost all systems including respiratory, cardiovascular, gastrointestinal, neurological, psychiatric, and dermatological systems. We aimed to investigate the prevalence and characteristics of the post-COVID syndrome among COVID-19 survivors and to determine the factors associated with persistent symptoms. This prospective study enrolled in patients with COVID-19 followed in hospital or outpatient clinics in Ankara City Hospital. We performed a special questionnaire to inquire about the presence of persistent symptoms beyond 12 weeks from the first diagnosis. Demographic data, comorbid diseases, characteristics of acute COVID-19, presence of persistent symptoms by systems, and knowledge about outpatient clinic visits after recovery were assessed. Of a total of 1007 participants, 39.0% had at least one comorbidity, and 47.5% had persistent symptoms. Fatigue/easy fatigability, myalgia, and loss of weight were the most frequent persistent symptoms (overall 29.3%) followed by respiratory symptoms (25.4%). A total of 235 participants had visited outpatient clinics due to several reasons during the post-COVID-19 period, and 17 of them were hospitalized. Severe acute COVID-19, hospitalization, and presence of comorbidity were independent factors for the development of persistent symptoms. Fully understanding the spectrum of the post-COVID syndrome is essential for appropriate management of all its long-term effects. Our study once again underlined the fact that the prevalence of post-COVID syndrome is higher than expected and concerns many systems, and a multidisciplinary follow-up should be provided to COVID-19 survivors in the post recovery period.

KEYWORDS

COVID-19, long-COVID, persistent symptoms, post-COVID, prevalence, questionnaire

1 | INTRODUCTION

Coronavirus disease 2019 (COVID-19) has been one of the major pandemics affecting all the world and human beings since the end of 2019. Although the severe course of the disease has caused concern since the beginning of the pandemic, as time has passed, the appearance of many post recovery manifestations on survivors has become another cause for concern. Numerous reports from various parts of the world have shown that COVID-19 has a variety of long-term effects on almost all systems including respiratory, cardiovascular, gastrointestinal, neurological, psychiatric, and dermatological systems.¹ A considerable part of patients, up to 87.5%, recovering from acute infection continue to suffer from a variety of symptoms including dyspnea, cough, myalgia, fatigue, and headache.²⁻⁴ The data that people who have mild illness or no symptoms during acute infection also suffer from long-term symptoms exhibit that the disease causes greater damage than appears in infected persons.

The nomenclature about ongoing symptoms after recovery and the determination of their periods differs in studies and institutions' definitions such as the Centers for Disease Control and Prevention (CDC) and The National Institute for Health and Care Excellence (NICE).^{1,5-7} Greenhalgh et al.⁵ defined ongoing symptoms beyond 3 weeks from the disease onset as post-acute COVID-19 and beyond 12 weeks as chronic COVID-19.⁷ CDC proposed dividing the disease into three periods such as acute COVID-19 (the first 2 weeks from symptom onset), post-acute hyperinflammatory illness (between 2 and 4 weeks from symptoms onset), and late sequelae period (more than 4 weeks from symptom onset) based on the population-based framework.⁵ The NICE guideline recommends using the term long-COVID for signs and symptoms that continue for more than 4 weeks and are not explained by an alternative diagnosis, and the term post-COVID syndrome for ongoing signs and symptoms beyond 12 weeks after infection.⁶ Here, we presented a single-center questionnaire study assessing the prevalence, variety, and severity of persistent symptoms in the post-COVID period and investigating the post recovery follow-up, outpatients clinic visits, and hospital re-admissions. We preferred to use post-COVID syndrome for the ongoing symptoms and signs of more than 12 weeks.

2 | MATERIAL AND METHODS

2.1 | Study design and participants

This prospective study was conducted in patients with COVID-19 who were hospitalized in COVID-19 wards or followed in outpatient clinics in Ankara City Hospital, between August 1, 2020, and October 31, 2020. The ethical approval was obtained from Ankara City Hospital Ethical Committee 1.

In late May 2020, the hospital administration established post-COVID outpatient clinics for COVID-19 individuals discharged from the hospital after recovering from the disease and those who recovered without the need for hospitalization. The diagnosis of

COVID-19 was based on a positive severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) polymerase chain reaction on a nasopharyngeal sample and/or typical pulmonary involvement on computed tomography. COVID-19 survivors who met World Health Organization (WHO) criteria for discontinuation of isolation (for symptomatic patients; 10 days after symptom onset, plus at least three additional days without symptoms, and for asymptomatic cases; 10 days after a positive test for SARS-CoV-2 without requiring retesting) were followed up in these clinics.⁸

We designed a special questionnaire to inquire about the current health status of patients and their persistent symptoms in the post-COVID period and contacted all eligible patients. As this survey aimed to investigate the prevalence of post-COVID syndrome, participants who have had COVID-19 at least 3 months before were included in the survey. The questionnaires were filled out by trained three independent physicians face-to-face or by telephone between December 2020 and February 2021. Face-to-face questionnaires were performed in our COVID-19 outpatient clinics. At the beginning of the questionnaire, the respondents were asked if they accept to participate in the study, and after verbal consent, the questions in the survey were directed to the participants. After the patient records were completed, the data were checked by a study member, other than those who performed the questionnaire.

2.2 | Content of survey

The information included in the questionnaire were age, sex, comorbid diseases, characteristics of acute COVID-19, history of hospitalization (disease severity, length of hospital stay, need for respiratory supports, and need for intensive care unit [ICU]), duration since symptoms onset, presence of persistent symptoms by systems, and knowledge about outpatient clinic visits after recovery. Data about acute COVID-19 were obtained from respondents' own selves and the hospital automation system. Acute COVID-19 disease severity of patients was recorded as mild to moderate, severe, and critical illness based on WHO COVID-19 technical guidelines.⁹ The duration of disease was calculated from the first COVID-19 diagnosis and it was taken into consideration that a period of at least 3 months after recovery should be passed to avoid confusion regarding terminology. The symptoms of patients were grouped by the systems as follows: general (fatigue or easy fatigability, myalgia, and loss of weight), respiratory (dyspnea, chest pain, cough, and wheezing), cardiovascular (palpitation), neuropsychiatric (headache, insomnia, hypersomnia, nightmare, concentration or memory deficit, and mood changes as depression and anxiety), dermatologic (hair loss and rash), gastrointestinal (abdominal pain, diarrhea, and constipation), and genitourinary systems (uncontrolled bladder). To evaluate the level of being affected by the symptoms, participants were asked to score each symptom from 0 (have no problem) to 10 (have extreme). We used a scale to investigate the out-of-hospital situation of the participants based on a scale of COVID-19 Yorkshire Rehabilitation Screening (C19-YRS) Tool and applied it to each symptom.¹⁰ Outpatient clinics where the patients visited, whether there was a need for medical assistance or a

need for rehospitalization were questioned. Information was asked about the reasons for medical assistance and reasons for rehospitalization and the clinics where the patients were hospitalized. The number of days patients are away from work and the current daily activity performance status of the patients were evaluated.

2.3 | Statistical analysis

All analyses were performed using IBM SPSS V.21 software version. Descriptive statistics were presented as mean \pm standard deviation (SD) or medians plus with quartiles (interquartile range [IQR] 25th–75th percentile) for continuous variables that do not have a normal distribution and as frequency and percentages for categorical variables. Student t-test was used in the comparison of continuous variables for normally distributed data, and Mann–Whitney U test for non-normal distribution. The χ^2 test was used for comparing categorical variables in parametric conditions. A *p* value of less than 0.05 was considered statistically significant. Multivariate logistic regression was used to determine independent predictors for persistent symptoms beyond 12 weeks after recovery.

3 | RESULTS

3.1 | Characteristics of survey cohort

During the study period, 1092 individuals who recovered from COVID-19 were asked if they accepted to participate in the study, 85 of them refused responding to the questionnaire. The survey was performed with a total number of 1007 participants. The mean age was 45.0 ± 16.4 (18–88) and 39.9% were 50 years and older. Of the participants, 54.4% were male, and 39.0% had at least one comorbidity, the most common comorbidities were hypertension (20.3%), diabetes (15.4%), and coronary artery disease (7.0%). The majority of the patients (71.8%) had a mild-to-moderate COVID-19 in the acute stage of the disease. Of the patients, 68.5% had been working a job. Hospitalization had been required in 416 patients (41.3%) at the initial time of the disease. Of the hospitalized patients, 249 (59.6%) required oxygen support and 58 (13.9%) ICU follow-up. Baseline demographic and characteristics of acute COVID-19 of the patients are presented in Table 1.

3.2 | Characteristics of post-COVID manifestations

Approximately half of the participants (47.5%) had persistent symptoms, and more than half of the patients having symptoms had three or more symptoms. Time since first COVID-19 diagnosis was median 20 weeks (IQR 19–22). General systemic symptoms including fatigue or easy fatigability, myalgia, and loss of weight were the most frequent persistent symptoms, and at least one of them was present in 29.3% of patients. Respiratory symptoms (25.4%) were the second common persistent symptoms and one-fifth of the patients complained of dyspnea. Of the patients, 24.2% suffered from persistent

TABLE 1 Demographical and clinical characteristics of participants (*n* = 1007)

Characteristics of respondents	Value
Age, years, <i>n</i> (%)	
18–34	333 (33.1)
35–49	272 (27.0)
≥ 50	402 (39.9)
Gender, male sex, <i>n</i> (%)	548 (54.4)
Body mass index, mean \pm SD (min–max) (for <i>n</i> = 898)	27.3 \pm 4.7 (16.0–48.0)
Body mass index, (for <i>n</i> = 898)	
≤ 25	319 (31.7)
≥ 26	579 (57.9)
Comorbid disease, at least one, <i>n</i> (%)	390 (39.0)
Hypertension, <i>n</i> (%)	204 (20.3)
Diabetes, <i>n</i> (%)	155 (15.4)
Coronary artery disease, <i>n</i> (%)	70 (7.0)
Thyroid disease, <i>n</i> (%)	21 (2.1)
Rheumatologic disease, <i>n</i> (%)	19 (1.9)
Kidney failure, <i>n</i> (%)	10 (1.0)
Chronic obstructive pulmonary disease, <i>n</i> (%)	50 (5.0)
Malignity, <i>n</i> (%)	8 (0.8)
Others, <i>n</i> (%)	65 (6.5)
Number of comorbidities, <i>n</i> (%)	
1	232 (23.0)
2	104 (10.3)
≥ 3	54 (5.4)
Number of patients who employee, <i>n</i> (%)	690 (68.5)
Acute COVID-19 characteristics, <i>n</i> (%)	
Disease severity, <i>n</i> (%)	
Mild to moderate	723 (71.8)
Severe disease	212 (21.1)
Critical illness	72 (7.1)
Follow-up of the patient, <i>n</i> (%)	
In outpatient	591 (58.7)
In hospital	416 (41.3)
Respiratory supports in hospitalized patients (for <i>n</i> = 416), <i>n</i> (%)	
Oxygen support	249 (59.6)
Need for intensive care unit	58 (13.9)
Need for mechanical ventilation	3 (0.7)

TABLE 1 (Continued)

Characteristics of respondents	Value
CPAP/HFO	31 (7.5)
Discharge with long-term oxygen therapy (LTOT)	12 (2.9)
Length of hospital stay (days), median (IQR)	6 (4–9)

Abbreviations: COVID-19, coronavirus disease 2019; CPAP, continuous positive airway pressure; HFO, high flow oxygen; IQR, Interquartile range; SD, standard deviation.

symptoms associated with neuropsychiatric disorders. Neuropsychiatric system symptoms were the third most common system symptoms. Concentration or memory deficit (16.2%) and insomnia (9.6%) were the most frequent neurological symptoms and followed by headache (5.7%). Depression and anxiety were present in 8.9% and 8.1% of the patients, respectively, before having COVID-19. Eleven and 15 patients reported having new-onset depression and anxiety after COVID-19, respectively. Hair loss was reported as a frequent dermatological symptom by COVID-19 survivors (16.5%). Participants scored their symptoms usually at three or four levels except for hair loss and loss of smell when there were asked to evaluate the levels of being affected by symptoms. The patients scored hair loss as 6^{5–8} and loss of smell as 5.^{4–6} Characteristics of post recovery persistent symptoms are shown in Table 2 and Figure 1.

A total of 235 participants reported that they visited outpatient clinics (a total of 259 times) during the post-COVID-19 period. Of them, 17 (1.7) had been hospitalized. The most common reasons for outpatient clinic visits were complaints related to respiratory (10.0%), cardiovascular (3.9%), and musculoskeletal system (2.6%). Of 17 patients hospitalized in the post-COVID period, 6 were due to respiratory reasons, 6 to cardiac, 2 to neurological disease, 2 to the embolic event, and 1 to physical rehabilitation. The median work-day loss was 10 days (IQR 10–15). Of the participants, 31.8% reported experiencing loss of daily activity performance at a moderate level (Table 3).

Most outpatient admissions were made to infectious diseases (22.8%), cardiology (14.3%), and internal medicine (13.1%). The distribution of outpatient clinic visits after recovery is shown in Figure 2.

In multivariate analysis, having a severe acute illness, hospitalization, and presence of comorbidity were detected as independent factors for the development of persistent symptoms (Table 4).

4 | DISCUSSION

In the present study, we assessed the prevalence and characteristics of the post-COVID syndrome in a large population consisted of 1007 patients recovered from acute COVID-19 and demonstrated that half of the patients suffer from persistent symptoms, although more than 4 months have passed after acute infection. The studies in the literature investigating post-COVID symptoms were usually performed in the early

TABLE 2 Post recovery persistent symptoms after a median 20 weeks since the first diagnosis (*N* = 1007)

Characteristics	Value	Scale (0–10)
Persistent symptoms, <i>n</i> (%)		
Present	478 (47.5)	
Absent	529 (52.5)	
Weeks since symptom onset, median (IQR)		
Persistent symptoms, median number (IQR) (<i>n</i> = 478), <i>n</i> (%)	3 (2–5)	
1 or 2 symptoms	233 (48.7)	
≥3 symptoms	245 (51.3)	
Persistent symptoms by systems, <i>n</i> (%)		
General, <i>n</i> (%)		
Fatigue or easy fatigability	24 (24.3)	4 (3–5)
Myalgia	133 (13.1)	4 (3–5)
Loss of weight	33 (3.3)	3 (3–5)
Respiratory symptoms, <i>n</i> (%)		
Dyspnea	207 (20.5)	4 (3–6)
Chest pain	58 (5.8)	3 (2–4)
Cough	45 (4.5)	3 (2–4)
Wheezing	41 (4.1)	3 (2–4)
Cardiovascular, palpitation, <i>n</i> (%)		
	65 (6.4)	3 (3–4)
Neuropsychiatric disorders, <i>n</i> (%)		
Concentration or memory deficit	163 (16.2)	4 (3–5)
Insomnia	96 (9.6)	4 (3–5)
Headache	57 (5.7)	4 (3–5)
Hypersomnia	36 (3.6)	4 (3–5)
Nightmare	8 (0.8)	
Depression, before COVID-19	89 (8.9)	
New-onset depression after COVID-19	11 (1.1)	4 (3–5)
Anxiety, before COVID-19	81 (8.1)	
New-onset anxiety after COVID-19	15 (1.5)	5 (4–6)
Dermatological, <i>n</i> (%)		
Hair loss	165 (16.5)	6 (5–8)
Rash	10 (0.9)	3 (2–4)
Otolaryngology, <i>n</i> (%)		
Loss of smell	31 (3.1)	5 (4–6)
Loss of taste	21 (2.1)	4 (3–5)
Gastrointestinal, <i>n</i> (%)		
Abdominal pain	4 (0.4)	3 (3–4)

(Continues)

TABLE 2 (Continued)

Characteristics	Value	Scale (0–10)
Diarrhea	1 (0.1)	4
Constipation	3 (0.3)	4 (3–5)
Genitourinary system, uncontrolled bladder, pollakiuria, n (%)	8 (0.8)	3 (3–4)

Note: To evaluate the level of being affected by the symptoms, participants were asked to score each symptom from 0 (have no problem) to 10 (have extreme) based on a scale of COVID-19 Yorkshire Rehabilitation Screening (C19-YRS) Tool. Point 0 = participant is not affected by the symptom, point 10 = the participant is affected extremely by the symptoms. C19-YRS tool has been developed by multidisciplinary-rehabilitation teams to assess the patients in terms of their ongoing symptoms of COVID-19 and to provide guidance for the required rehabilitations.

Abbreviations: COVID-19, coronavirus disease 2019; IQR, interquartile range.

period after recovery or in a relatively small number of patients.^{3,4,11–18} There is growing concern regarding post-COVID syndrome, but still little is known. Understanding the prevalence, variety, and duration of the post-COVID manifestations that are not usually life-threatening but impair the quality of life, is crucial for the development of follow-up and treatment strategies in the post-COVID periods.

4.1 | Prevalence of post-COVID syndrome

In our study, 47.5% of the participant reported suffering from one or more persistent symptoms at the time of the questionnaire. Previous studies have reported persistent symptoms in a wide range varying from 13.3% to 96.0%, but most of them reported high rates.^{3,4,11–18} The diversity in study results can be explained with the differences in several factors: the characteristics of the study population (e.g., inpatients/outpatients, differences in disease severity of patients enrolled in the study), study designs (e.g., active questioning, analyzing of outpatient clinic and readmission records, or self-reporting app), or time elapsed after acute infection. Some studies have been performed in a relatively early period after the acute infection but have reported similar rates of persistent symptoms.^{11,13,14} Similar to our study, in a prospective study from Spain, Moreno-Pérez et al.¹⁷ reported the prevalence of post-COVID syndrome as 50.9% 10–14 weeks after the onset of the disease. In two small-sized studies, the prevalence of post-COVID syndrome was reported as high as 87.5% and 96%.^{3,16} In a U.K study that screened electronic medical records of 47 780 patients recovering from acute illness and discharged from hospital, one-third of patients were re-hospitalized, and more than one-tenth died during an average follow-up period of 140 days.¹⁸ However, all three studies were done only in hospitalized patients. Therefore, relatively severe patients are likely to be included in studies. Here,

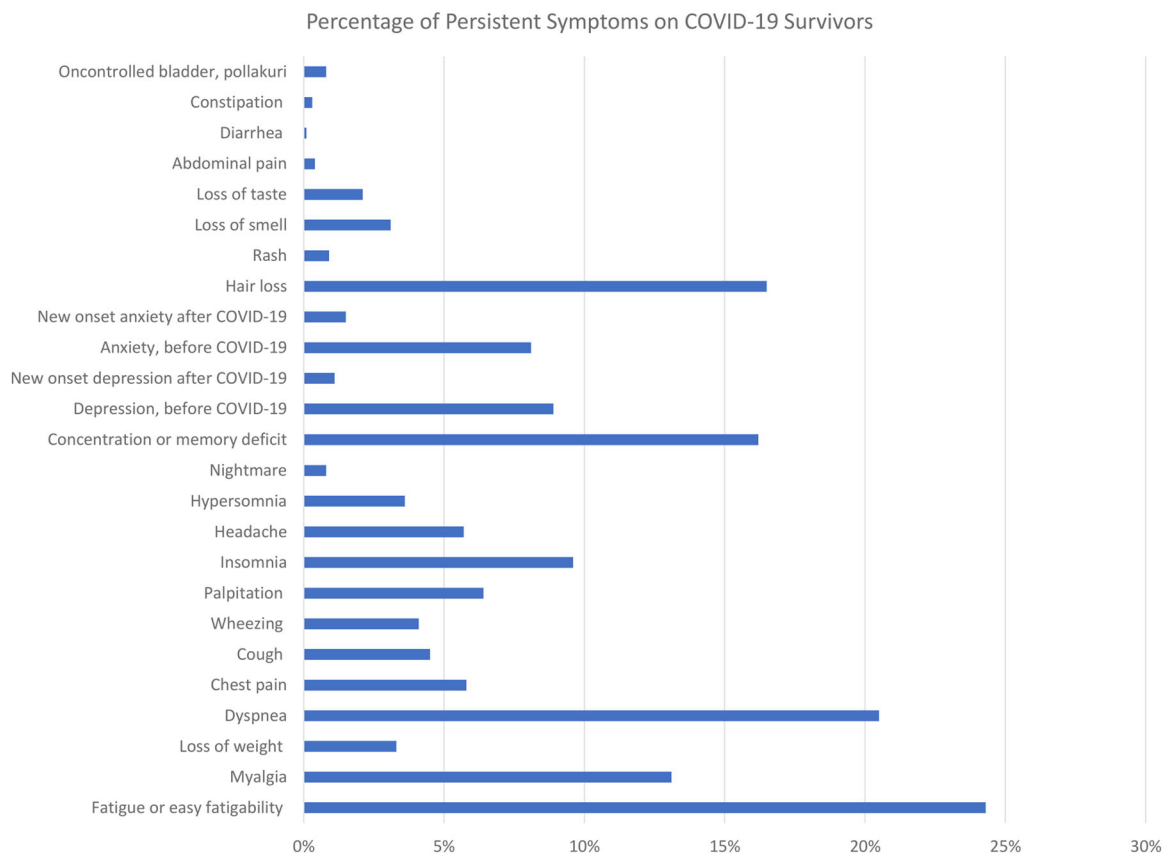


FIGURE 1 Percentage of persistent symptoms on coronavirus disease 2019 survivors

TABLE 3 The characteristics of the post-COVID-19 disease (*n* = 1007)

Characteristic	Value
Number of patients who attend the outpatient clinics after recovery, <i>n</i> (%)	237 (23.5)
Total number of outpatient clinic visits after recovery, number	259
Reasons for outpatient clinic visit, <i>n</i> (%)	
Respiratory symptoms	101 (10.0)
Cardiovascular system	39 (3.9)
Musculoskeletal system	26 (2.6)
Dermatological symptoms	10 (1.0)
Neurologic symptoms	7 (0.7)
Pulmonary thromboembolic	5 (0.5)
Psychiatric	5 (0.5)
Need for medical assistance, <i>n</i> (%)	90 (8.9)
Number of patients re-hospitalized, <i>n</i> (%)	17 (1.7)
Reasons for rehospitalization, <i>n</i> (%)	
Respiratory reasons	6 (0.6)
Cardiovascular reasons	6 (0.6)
Embolic event	2 (0.2)
Neurologic reasons	2 (0.2)
Physical rehabilitation	1 (0.1)
Number of patients who had work-day loss, <i>n</i> (%)	
10–14 days	516 (74.8)
15–29 days	99 (9.8)
≥ 30 days	75 (7.4)
Work-day loss, median (IQR)	10 (10–15)
Patients number experiencing loss of daily activity performance, <i>n</i> (%)	321 (31.8)

Abbreviations: COVID-19, coronavirus disease 2019; IQR, interquartile range.

we included patients who were followed up both outpatients and inpatients in all severity levels of the disease, from mild to critical illness. Therefore, the study population represents almost the entire COVID-19 population.

4.2 | Spectrum of the post-COVID syndrome

COVID-19 is a multisystem disease with a wide range of long-term effects on almost all systems. Therefore, clinical multidisciplinary evaluation should be done to manage long-term persistent symptoms and to minimize post-COVID ongoing harmful effects. In our study, more than half of the patients having persistent symptoms had three or more symptoms. The

previous two studies reported three or more persistent symptoms in 55.2% and 19.7% of the patients.^{3,14} Systemic symptoms were the most common complaints, and 24.3% of the patients reported suffering from fatigue/easy fatigability. Several other studies also reported fatigue as the most common symptom.^{3,4,11,12,14,16}

COVID-19 can lead to pulmonary complications such as fibrosis, cough, and bronchiectasis. Dyspnea may not be completely improved in some of the patients. Long-term lung damage such as irreversible dyspnea is one of the feared features of COVID-19. Similar to the previous studies, we detected respiratory symptoms (particularly dyspnea) as the second common complaint.^{3,11,12,14,16} However, patients scored their dyspnea as 4 based on the scale, and only one-third of patients with respiratory complaints needed to visit a healthcare center. In support of our study, Moreno-Pérez et al.¹⁷ evaluated 277 patients face-to-face 10–14 weeks after disease onset and reported that although they detected post-COVID syndrome in half of the patients recovered from COVID-19, radiological and spirometric changes were mild and present in less than one-fourth of patients. Cardiac complications are also well-defined disorders and strongly predict mortality among COVID-19 patients. Cardiology was the second outpatient clinic that patients were mostly admitted to, 14.3 of all admissions to outpatient disease admission was made to it. When the pandemic is over, it looks like it will leave residual lung problems and cardiac disorders in a substantial number of patients.

Supporting previous reports, a considerable part of the patients suffered from neuropsychiatric disorders such as concentration or memory deficit, insomnia or hypersomnia, headache, and new-onset depression, and anxiety even 20 weeks after infection. However, most of them ignored their symptoms, very few patients had visited the outpatient clinic. Several peer-reviewed studies, reviews, and meta-analyses pointed out the neuropsychiatric effects of COVID-19 in survivors.^{19–21} In a meta-analysis including 55 peer-reviewed studies, the prevalence of depression, anxiety, and insomnia was reported as 15.97%, 15.15%, and 23.87% in COVID-19 patients, respectively.¹⁹ COVID-19 has also different cutaneous manifestations. We inquired patients about hair loss, and of participants in our study, 18% complained of hair loss. Similar to our study, a short telephone survey by Garrigues et al.²² reported that 24% of the participants complained of hair loss on average 110.9 (±11.1) days after admission.

We used a scale to investigate the out-of-hospital situation of the participants with a scale based on the C19-YRS tool. C19-YRS tool is a telephone screening tool and has been developed by multidisciplinary-rehabilitation teams to assess the patients in terms of their ongoing symptoms of COVID-19 and to provide guidance for the required rehabilitations.¹⁰ The patients with persistent symptoms reported their symptoms relatively at a mild-to-moderate level at the time of the questionnaire. The C19-YRS toll aims to provide an intervention guide to provide needed support in the

Distribution of Outpatient Clinic Visit After Recovery

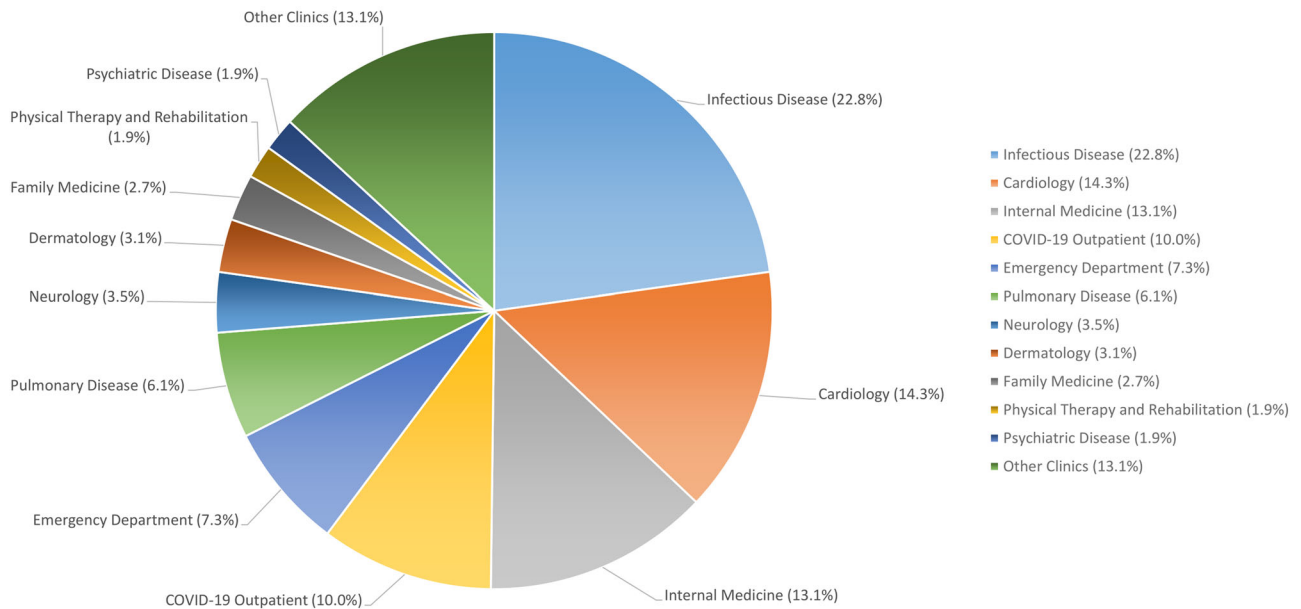


FIGURE 2 Distribution of outpatient clinic visit after recovery

TABLE 4 Univariate analysis and multivariate logistic regression analysis for development of persistent symptoms

	Persistent symptoms		p value	Odds ratio	95% CI	p value
	Present n = 478	Absent n = 529				
Age, median (min–max)	50 (18–87)	38 (18–88)	<0.001			
Gender, male sex, n (%)	248 (51.9)	300 (56.7)	0.07			
BMI, mean ± SD (min–max) ^a	28 (16–48)	26 (18–48)	<0.001			
Hospitalization, n (%)	300 (62.8)	115 (21.7)	<0.001	4.695	3.226–6.832	0.000
Comorbidity, n (%)	247 (51.7)	130(24.6)	<0.001	1.693	1.180–2.429	0.004
Disease severity, severe/critical, n (%)	61 (12.8)	9 (1.7)	<0.001	3.069	1.466–6.428	0.003

Abbreviations: BMI, body mass index; CI, confidence interval; SD, standard deviation.

^aBMI was performed on 898 participants.

community. Thus, the individuals may be easily directed to the relevant clinics or rehabilitation centers.

4.3 | Post recovery outpatient clinic visits

The persistent symptoms may be associated with different reasons including the sequel of infection, ongoing inflammation, complications of COVID-19, or complications related to treatments drugs, non-specific effects of hospitalization, or deconditioning.²³ Therefore, some patients have to attend outpatient clinics, and some are re-hospitalized. In the present study, one-quarter of the participants visited outpatient clinics or emergency departments due to mostly respiratory and cardiovascular symptoms, but 1.7% of them had to hospitalized. Unlike our study, one-third of patients were re-

hospitalized after discharge in a study from the UK, probably due to early discharge.¹⁸

4.4 | Returning to usual activity

Patients with persistent symptoms reported their symptoms relatively at a mild-to-moderate level. However, returning to usual daily activity took time after COVID-19. Garrigues et al.²² reported that only 69.1% of participants had gone to work at the time of the questionnaire. Similarly, COVID-19 had caused the work-day loss of more than 15 days in 17.2% of the participants who were previously active workers in our study. One-third of all participants reported experiencing loss of daily activity performance at a moderate level at the time of the questionnaire. Ongoing symptoms have several

physiological, psychiatric, and social adverse outcomes in the patients. Considering the increasing numbers of COVID-19 cases, and the high prevalence of post-COVID syndrome, it seems that COVID-19 is inevitably placing a big burden on the health system and socioeconomic status of countries.

4.5 | Factors associated with symptom persistence

In the present study, although most participants had a mild-moderate COVID-19, persistent symptoms were common even among them. Hospital admission for acute COVID-19, severe COVID-19, and presence of comorbidity were independent predictors for the development of symptom persistence. Previous studies reported a relationship between disease severity, hospital admission, and COVID-19 manifestations which is similar results to our finding.^{4,6,14} In contrast to our results, two other previous studies did not find an association between comorbidity and post-COVID syndrome.^{14,17} More than three comorbidities were reported as a predictor for a delayed return to usual health status in another study.¹² The severity of acute disease and the requirement of hospital admission appear to be the main predictors for post-COVID syndrome. As severe COVID-19 usually required prolonged hospitalization and therefore, patients had to struggle with several problems such as the development of a complication, physiological changes, and deconditioning, this is an expected result.^{12,23}

There are many strengths of our study. First, to our knowledge, this study, investigating the post-COVID syndrome through a one-to-one questionnaire, has the highest number of participants with more than one thousand. Second, the study included an adequate number of patients from each of the disease severity categories, including mild-moderate, severe, and critical illness, like its real prevalence among the community. Therefore, it represents well the population of COVID-19. Thirdly, we investigated features of admission to outpatient clinics such as its prevalence and reasons and the rates of hospitalization, and medical assistance. Fourth, we used a scale from 0 to 10 to evaluate the levels of being affected by symptoms.

This study has some limitations. This study is based on the patient's self-declaration. There may be differences in perceiving and expressing or taking seriously patients' symptoms. And the retrospective character of our study may cause some information not to be remembered. In addition, the study was conducted in a large but single center.

5 | CONCLUSION

Our results showed that a considerable part of patients with COVID-19 had persistent symptoms even 4–5 months after COVID-19 diagnosis, and even patients with a mild-to-moderate disease suffered from persistent symptoms. Some patients visited the outpatient clinics particularly for respiratory or cardiovascular symptoms, however, patients with neuropsychiatric symptoms

ignored their symptoms possibly due to low awareness of symptoms. Although the persistent symptoms of the patients are not vital, follow-up of these symptoms in the postrecovery period is important due to its resulting disrupting life quality. Patients should be enlightened about the long-term effects of COVID-19 and awareness about postrecovery follow-up should be raised. The appropriate evaluation of the individuals in the post recovery period may provide their direction to the relevant clinics and good guidance for rehabilitation. Overall, COVID-19 is different from classical respiratory infections and requires detailed monitoring, even after recovery. In the post-COVID period, health care should be planned as multidisciplinary care to address the patient as a whole.

CONFLICT OF INTERESTS

The authors declare that there are no conflicts of interest.

AUTHOR CONTRIBUTIONS

Bircan Kayaaslan: Conception and design of the study; analysis and interpretation of data; and writing-review. **Fatma Eser:** Conception and design of the data; interpretation of data. **Ayşe K. Kalem:** Review and editing. **Gamze Kaya:** Acquisition of data. **Betul Kaplan:** Acquisition of data. **Duygu Kacar:** Acquisition of data. **Imran Hasanoglu:** Review and editing. **Belgin Cosgun:** Interpretation of data. **Rahmet Guner:** Conception and design of the study; interpretation of data.

ORCID

Imran Hasanoglu  <https://orcid.org/0000-0001-6692-3893>

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