The most common persistent symptoms in patients with COVID-19 who were evaluated in the Internal Medicine polyclinic

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ABSTRACT

Objectives: To identify continuing symptoms of individuals in the post-COVID period. To begin with our study was planned to research the most common persistent symptoms in the post-COVID period, and additionally to research whether or not there were differences between the most frequent initial symptoms in the 1st, 2nd and 3rd waves of the pandemic.
Methods: Cases attending the internal medicine clinic infected with COVID-19 who were minimum 120 days past the infection were included in the study. The study was shaped by responses of cases to open-ended questions.
Results: From a total of 2,802 clinical attendances, 1,005 cases were included in the study. Of cases, 9.3% required clinical monitoring and 1.7% required intensive care during infection. The mean number of persistent symptoms was 1.38, with the most common persistent symptoms being 11.2% fatigue/tiredness, 6.1% shortness of breath, and 4.6% back and low back pain. Mean number of initial symptoms was 1.63, with the most common initial symptoms being 21.2% fatigue, 19.4% fever and 19.1% headache. Persistent chest pain was most common among those infected in the 1st wave, while there were no other significant differences observed between pandemic waves.
Conclusions: The most common persistent symptoms were consistent with the general literature data; however, our condition of minimum 120 days past infection allowed a range of symptoms to ameliorate. Our results are more realistic in this way. A range of rare persistent symptoms emerging in our results were not encountered in the literature, while our study is unique as there is no other study comparing pandemic periods.
Keywords: COVID-19, persistent symptom, post-COVID-19

The first case of the coronavirus disease 2019 (COVID-19) pandemic linked to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was recorded in Wuhan city in China in December 2019 and it spread rapidly around the world since this first case [1]. The mortality rate for SARS-CoV-2 is 2%, while this novel coronavirus generally is associated with mild and/or severe respiratory tract disease [2]. The term Long COVID or post-COVID describes the situation characterized by continuation of symptoms for at least 12 weeks after initial infection. This situation forms an observation problem and may last several months. Symptoms and clinical findings are very diverse and include cardiovascular system symptoms

leading to consideration of multiple organ/system involvement. The most commonly observed symptoms are fatigue, shortness of breath, muscle pain, headache, memory loss and concentration disorders. Patients frequently report loss of psychological and physiological performance in this period [3]. Our study was planned to research the frequency of COVID-19 infection among patients attending the internal medicine clinic in our hospital, initial symptoms, persistent symptoms if any and whether there were differences between the 1st, 2nd and 3rd waves of the pandemic.

METHODS

This cohort study questioned whether patients attending the internal medicine clinic for any reason had been infected with COVID-19. Cases aged 18 and over at the time of infection were included in the study. Cases with minimum 120 days since infection and with SARS-CoV-2 infection confirmed by PCR who provided consent were included in the study. Cases were asked open-ended questions. Patients were asked about age, sex, body mass index, additional diseases and comorbidities, the wave of the pandemic when they were infected, clinical and/or intensive care unit admission and if so, number of days of hospitalization, features and duration of initial symptoms during the disease period, persistent symptoms in the post-COVID period in spite of 120 days passing since recovery from acute infection, vaccination status, whether they were infected with COVID-19 more than

once, smoking habit and detection of any SARS-CoV-2 variant apart from the common strain during the infection period. Patients with clinical/intensive care monitoring were included in the study if they were monitored by the clinic/intensive care in our hospital. The wave of the pandemic when cases were infected was identified as 1st, 2nd or 3rd and we planned to research whether there were differences in initial complaints, unresolved complaints and descriptive findings between the pandemic waves. The 1st wave was defined as the period from March 2020 when the first case was identified in Turkey to June 2020, the 2nd wave was September 2020 to January 2021 and the 3rd wave was March 2021 to September 2021. Individuals under the age of 18 years, not infected with COVID-19, infected within the last 120 days and who did not provide consent were not included in the study. Ethics committee approval was obtained (decision no:2021/514/207/5)

Statistical Analysis

For statistical analyses, the Number Cruncher Statistical System (NCSS) 2007 (Kaysville, Utah, USA) program was used. When assessing study data, descriptive statistical methods (mean, standard deviation, median, frequency, percentage, minimum, maximum) were used. Fit of quantitative data to normal distribution was tested with the Shapiro-Wilk test and graphical investigations. Comparison between more than two groups of quantitative data with normal distribution used the one-way analysis of variance. Comparison of more than two groups of quantitative data without normal distribution used the Kruskal-Wallis
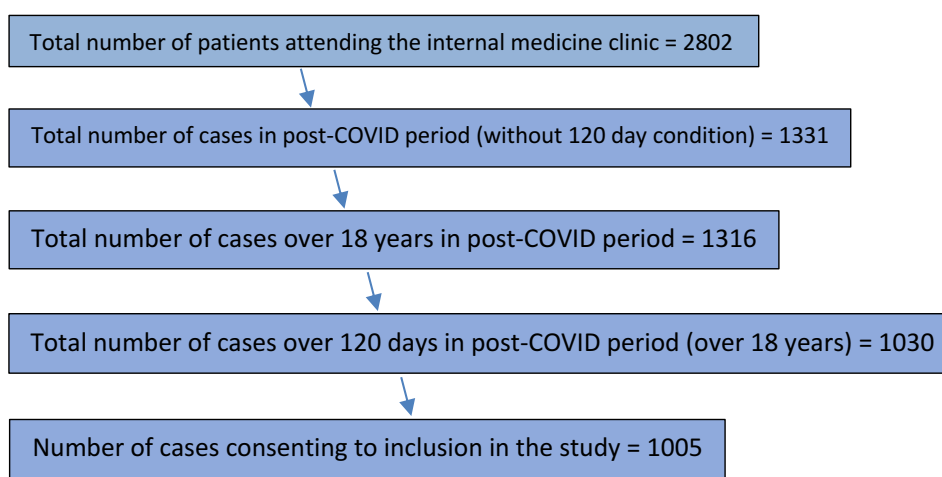

Fig. 1. Flow scheme for clinic attendance.

test. Comparison of qualitative data used the Fisher-Freeman-Halton exact test. Statistical significance was accepted as $p < 0.05$.

RESULTS

From July 2021 to October 2021, 2802 patients attending the internal medicine clinic were randomly asked whether they had been infected with COVID-19 and 1005 cases (35%) who abided by the criteria were included in the study (Fig. 1).

The total of 1005 cases, 60.2% (n = 605) were women and 39.8% (n = 400) were men. The ages of those participating in the research varied from 18 to 95 years, with mean age determined as 41.94 ± 14.78 years. Mean BMI of participants was identified as 27.64 ± 5.91 kg/m2. Of cases, 17.3% (n = 174) smoked. At least one comorbid disease was identified in 35.9% (n = 361) of cases. When comorbid diseases are investigated, 14.7% (n = 148) had hypertension, 12.3% (n = 124) had diabetes mellitus, 3.8% (n = 38)

had coronary artery disease/chronic obstructive pulmonary disease and 0.9% (n = 9) had other diseases (Table 1).

Among the cases, 9.3% (n = 93) were admitted to hospital. Hospitalization varied from 1 to 22 days, with mean hospitalization duration determined to be 8.32 ± 4.58 days. Of the cases, 1.7% (17) required intensive care admission. It appeared that 39.8% (n = 400) of cases had received at least 1 vaccination. Of cases, 98.3% (n = 988) were infected with COVID-19 once, 1.6% (n = 16) were infected twice and 0.1% (n = 1) were infected three times. Among the cases, 2.6% (n=26) had different variants observed. Total disease duration varied from 0 to 36 days, with mean duration 10.55 ± 9.10 days (Table 2).

Of cases, 92.1% (n = 926) had at least one initial symptom. When initial symptoms are investigated, 21.2% (n = 213) of cases had fatigue, 19.4% (n = 195) had fever, 19.1% (n = 192) had headache, and 15.9% (n = 160) had cough. Among cases, 9.8% (n = 98) had joint pain, 9.7% (n = 97) had low back/back pain, 8.6% (n = 86) had sore throat, 8% (n = 80) had muscle pain, and 5.9% (n = 59) had loss of taste and smell. Of cases, 5% (n = 50) had shortness of breath, 3.6% (n =

Table 1. Distribution of descriptive characteristics

	Data
Sex	
Female	605 (60.2)
Male	400 (39.8)
Age	41.94 ± 14.78
	42 (18-95)
BMI (kg/m²)	27.64 ± 5.91
	27.2 (0.0-62.3)
Smoker	
No	829 (82.7)
Yes	174 (17.3)
Comorbid disease	
No	644 (64.1)
Yes	361 (35.9)
DM	124 (12.3)
HT	148 (14.7)
COPD-CAD	38 (3.8)
Other	9 (0.9)

Data are mean ± standard deviation or median (minimum-maximum) or n (%)

Table 2. Distribution of findings related to disease

		Data
Hospitalization	No	912 (90.7)
	Yes	93 (9.3)
Admission duration (n = 81) (days)		8.32 ± 4.58
		7 (1-22)
ICU admission	No	988 (98.3)
	Yes	17 (1.7)
Vaccination	No	605 (60.2)
	Yes	400 (39.8)
Number of infections	1	988 (98.3)
	2	16 (1.6)
	3	1 (0.1)
Different variants	No	979 (97.4)
	Yes	26 (2.6)
Total duration of disease (days)		10.55 ± 9.10
		10 (0-36)

Data are shown as mean ± standard deviation or median (minimum-maximum) or n (%)

Table 3. Distribution of Initial Symptoms and Unresolved Complaints

Initial symptom	Data
No	79 (7.9)
Yes	926 (92.1)
Fatigue	213 (21.2)
Fever	195 (19.4)
Headache	192 (19.1)
Cough	160 (15.9)
Joint pain	98 (9.8)
Low back/back pain	97 (9.7)
Sore throat	86 (8.6)
Muscle pain	80 (8.0)
Loss of taste/smell	59 (5.9)
Shortness of breath	50 (5.0)
Nausea/vomiting	36 (3.6)
Shivering/shaking	36 (3.6)
Rhinitis/nasal blockage	32 (3.2)
Bone pain	26 (2.6)
Chest pain/	15 (1.5)
Leg pain	14 (1.4)
Diarrhea	14 (1.4)
Loss of appetite	14 (1.4)
Other	63 (6.3)
Number of initial symptoms	1.63 ± 0.75 1 (1-5)
Unresolved complaints	
No	589 (58.3)
Yes	419 (41.7)
Fatigue	113 (11.2)
Low back/back pain	46 (4.6)
Shortness of breath	61 (6.1)
Loss of taste/smell	29 (2.9)
No	29 (2.9)
Yes	29 (2.9)
Fatigue	28 (2.8)
Forgetfulness	26 (2.6)
Chest pain	17 (1.7)
Leg pain	16 (1.6)
Palpitations	11 (1.1)
Muscle pain	7 (0.7)
Other	97 (9.7)
Number of unresolved complaints	1.38 ± 0.65 1 (1-4)

Data are shown as mean ± standard deviation or median (minimum-maximum) or n (%)

36) had nausea/vomiting, 3.6% (n = 36) had shivering/shaking, 3.2% (n = 32) had nasal rhinitis/blockage, 2.6% (n = 26) had bone pain and 1.5% (n = 15) had chest pain or stabbing chest pain. Among cases, 1.4% (n = 14) had leg pain, 1.4% (n = 14) had diarrhea, 1.4% (n = 14) had loss of appetite and 6.3% (n = 63) had other complaints. The other 7.9% of cases were asymptomatic and were identified as positive due to contact and/or coincidental testing. While cases encountered 1 to 5 initial complaints, the mean number of symptoms was identified as 1.63 ± 0.75 (Table 3).

At least one persistent symptom was observed in 41.7% (n = 419) of cases. When unresolved complaints are investigated, 11.2% (n = 113) of cases had fatigue/tiredness, 4.6% (n = 46) had back/low back pain, 6.1% (n = 61) had shortness of breath, 2.9% (n = 29) had loss of taste and smell, 2.9% (n = 29) had cough, 2.9% (n = 29) had joint pain, 2.8% (n = 28) had headache, 2.6% (n = 26) had forgetfulness, 1.7% (n = 17) had chest pain, 1.6% (n = 16) had leg pain, 1.1% (n = 11) had palpitations, 0.7% (n = 7) had muscle pain and 9.7% (n = 97) had other complaints (Fig. 2 and 3).

Cases were identified to have between 1 and 4 unresolved complaints, with the mean number of persistent symptoms calculated as 1.38 ± 0.65. There were no statistically significant differences between the groups according to sex, age, height, weight, BMI, smoking status and presence of comorbid diseases ($p > 0.05$) (Table 4).

There was a statistically significant difference between groups according to vaccination status and COVID infection times ($p = 0.001$ and $p < 0.01$, respectively). Among those who were vaccinated, the rate with COVID infection during the 2nd wave was higher than the rate with COVID infection during the 3rd wave. There were no statistically significant differences between hospitalization and intensive care admission status, admission durations and total disease duration according to group ($p > 0.05$) (Table 5).

There were no statistically significant differences between initial symptoms of cases according to group ($p > 0.05$) (Table 6). According to the groups, there was a statistically significant difference between rates of chest pain among unresolved complaints of cases ($p = 0.015$ and $p < 0.05$, respectively). Those who were infected during the 1st wave had higher incidence of chest pain among unresolved complaints compared to those infected in the 2nd and 3rd waves. There was
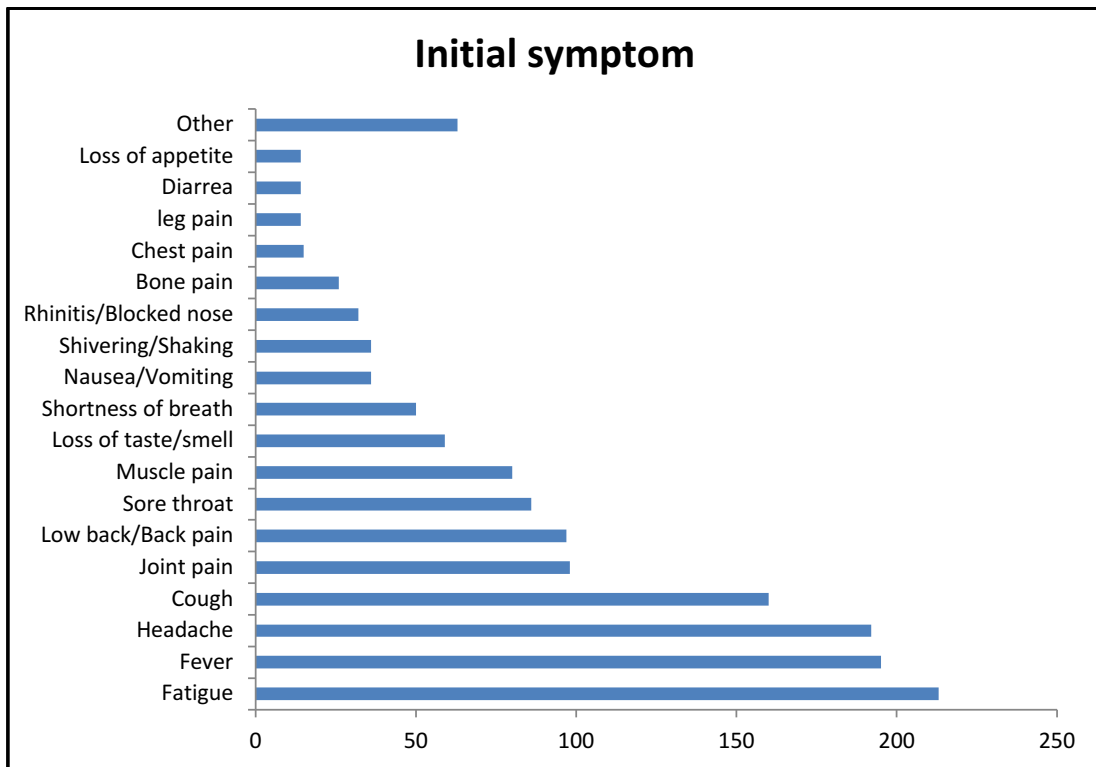
Fig. 2. Distribution of initial symptoms.

no statistically significant difference in incidence of unresolved complaints and other unresolved complaint types among cases according to groups ($p > 0.05$) (Table 7).

DISCUSSION

In the literature, the most frequent symptoms during the post-COVID-19 period are reported to be cough,
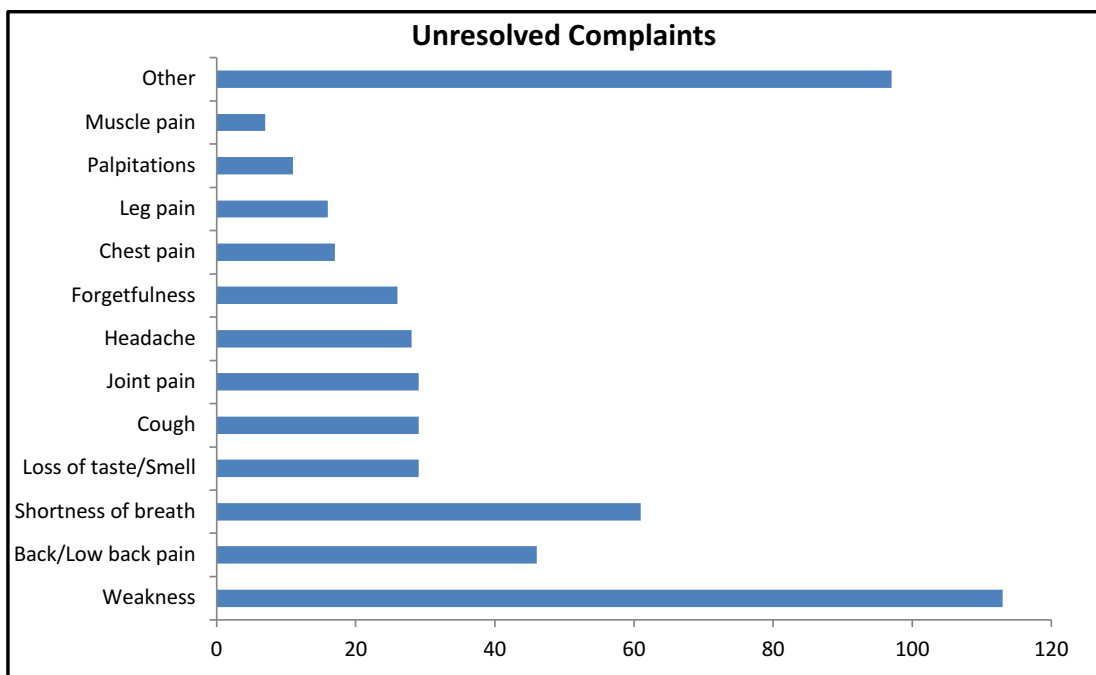

Fig. 3. Distribution of unresolved complaints.

Table 4. Assessment of descriptive characteristics according to group

	COVID infection time			
	1st wave (n = 40)	2nd wave (n = 520)	3rd wave (n = 445)	*p value*
Sex				
Female	22 (55.0)	304 (58.5)	279 (62.7)	[a]0.312
Male	18 (45.0)	216 (41.5)	166 (37.3)	
Age (years)	43.18 ± 13.05	42.22 ± 15.35	41.5 ± 14.26	[b]0.620
	42.5 (18-68)	42 (17-95)	42 (18-83)	
BMI (kg/m^2)	27.93 ± 5.81	27.77 ± 5.71	27.47 ± 6.14	[b]0.713
	27.2 (17.9-45)	27.3 (0-51.4)	27 (14.4-62.3)	
Smoker				
No	33 (82.5)	436 (84.2)	360 (80.9)	[a]0.406
Yes	7 (17.5)	82 (15.8)	85 (19.1)	
Comorbid disease				
No	26 (65.0)	337 (64.8)	281 (63.1)	[a]0.859
Yes	14 (35.0)	183 (35.2)	164 (36.9)	
DM	1 (2.5)	69 (13.3)	54 (12.1)	[a]0.117
HT	9 (22.5)	71 (13.7)	68 (15.3)	[a]0.262
COPD/CAD	0 (0)	18 (3.5)	20 (4.5)	[a]0.438
CRF	0 (0)	4 (0.8)	5 (1.1)	[a]0.817
Other	4 (10.0)	68 (13.1)	60 (13.5)	[a]0.904

Data are shown as mean ± standard deviation or median (minimum-maximum) or n (%). BMI = Body Mass Index, DM = Diabetes Mellitus, HT = Hypertension, COPD = Chronic obstructive pulmonary disease, CAD = Coronary artery disease, CRF = Chronic renal failure
[a]Fisher Freeman Halton Test, [b]One-way ANOVA Test

Table 5. Assessment of disease findings according to group

		COVID infection time			
		1st wave	2nd wave	3rd wave	*p value*
Hospitalization	No	33 (82.5)	480 (92.3)	399 (89.7)	[a]0.067
	Yes	7 (17.5)	40 (7.7)	46 (10.3)	
ICU admission	No	40 (100.0)	512 (98.5)	436 (98.0)	[a]0.820
	Yes	0 (0)	8 (1.5)	9 (2.0)	
Hospitalization duration (days)		6.83 ± 3.82	8.75 ± 5.38	8.15 ± 3.88	[b]0.588
		6 (3-14)	7.5 (1-22)	7 (1-18)	
Vaccination	No	9 (22.5)	108 (20.8)	154 (34.6)	[a]**0.001****
	Yes	31 (77.5)	412 (79.2)	291 (65.4)	
Total duration (days)		7.70 ± 4.01	10.40 ± 9.32	10.97 ± 9.12	[c]0.255
		7 (0-15)	9.5 (0-120)	10 (0-60)	

Data are shown as mean ± standard deviation or median (minimum-maximum) or n (%).
[a]Fisher Freeman Halton Test, [b]One-way ANOVA Test, [c]Kruskal Wallis Test, **p < 0.01

Table 6. Assessment of initial complaints according to group

| Initial symptom | COVID infection time | | | |
	1st wave	2nd wave	3rd wave	*p value*
No	5 (12.5)	41 (7.9)	33 (7.4)	[a]0.455
Yes	35 (87.5)	479 (92.1)	412 (92.6)	
Fatigue	7 (17.5)	107 (20.6)	99 (22.2)	[a]0.731
Fever	6 (15.0)	95 (18.3)	94 (21.1)	[a]0.445
Headache	8 (20.0)	106 (20.4)	78 (17.5)	[a]0.500
Cough	5 (12.5)	78 (15.0)	77 (17.3)	[a]0.544
Joint pain	2 (5.0)	55 (10.0)	41 (9.2)	[a]0.537
Low back/back pain	3 (7.5)	50 (9.6)	44 (9.9)	[a]0.967
Sore throat	3 (7.5)	40 (7.7)	43 (9.7)	[a]0.560
Muscle pain	5 (12.5)	39 (7.5)	36 (8.1)	[a]0.466
Loss of taste/smell	2 (5.0)	35 (6.7)	22 (4.9)	[a]0.514
Shortness of breath	1 (2.5)	24 (4.6)	25 (5.6)	[a]0.730
Nausea/vomiting	0 (0)	18 (3.5)	18 (4.0)	[a]0.566
Shivering/shaking	1 (2.5)	14 (2.7)	21 (4.7)	[a]0.214
Rhinitis/nasal blockage	1 (2.5)	19 (3.7)	12 (2.7)	[a]0.809
Bone pain	2 (5.0)	15 (2.9)	9 (2.0)	[a]0.281
Chest pain/	2 (5.0)	5 (1.0)	8 (1.8)	[a]0.060
Leg pain	1 (2.5)	8 (1.5)	5 (1.1)	[a]0.520
Diarrhea	1 (2.5)	7 (1.3)	6 (1.3)	[a]0.591
Loss of appetite	1 (2.5)	5 (1.0)	8 (1.8)	[a]0.255
Other	3 (7.5)	34 (6.5)	26 (5.8)	[a]0.800

Data are shown as n (%). [a]Fisher Freeman Halton Test

fever, dyspnea, musculo-skeletal system symptoms (myalgia, joint pain, fatigue), gastrointestinal symptoms and anosmia/dysgeusia [4]. A study of 143 patients in Italy by Carfi *et al*. [5] assessed cases for minimum 60 days after recovery from COVID-19 infection. Only 12.6% of cases did not have any symptom related to COVID-19, while 32% had 1 or 2 symptoms and 55% had 3 or more symptoms. No patient had any fever or acute disease finding or symptom. Cases described fatigue/weakness (53.1%), shortness of breath (43.4%), joint pain (27.3%) and chest pain (21.7%). After discharge, 87% of patients were identified to have minimum 1 symptom [5]. In our study assessing a total of 1005 cases, the most common persistent symptoms were parallel to those reported most frequently in studies by Carfi *et al*. [5], Mandal *et al*. [6], Halpin *et al*. [7], Huang *et al*. [10],

Peterson *et al*. [11], and Karaaslan *et al*. [12], with 11.2% reporting fatigue/tiredness. A study by Mandal *et al*. [6] of 384 cases in the United Kingdom showed general improvement during early follow-up of symptom burden in subjects recovering from COVID-19 after hospitalization. During the post-COVID period, 53% had permanent shortness of breath, 34% had permanent cough, 69% reported permanent tiredness and 15% of patients reported depression [6]. Halpin *et al*. [7] assessed 100 cases in the post-COVID period with 68 followed by the clinic and 32 in intensive care and investigated the effect of symptoms continuing after discharge and on daily life in the post-COVID period. New fatigue linked to the disease was the most frequently reported symptom among 72% of participants in the ICU group and 60% of those in the ward group. The next most common symptoms were shortness of

Table 7. Assessment of unresolved complaints according to group

| Unresolved complaints | COVID infection time | | | |
	1st wave	2nd wave	3rd wave	*p value*
No	27 (67.5)	292 (56.2)	267 (60.0)	a0.253
Yes	13 (32.5)	228 (43.8)	178 (40.0)	
Fatigue	4 (10.0)	50 (9.6)	59 (13.3)	a0.228
Low back/back pain	3 (7.5)	27 (5.2)	16 (3.6)	a0.272
Shortness of breath	1 (2.5)	29 (5.6)	31 (7.0)	a0.529
Loss of taste/smell	0 (0)	18 (3.5)	11 (2.5)	a0.494
Cough	0 (0)	13 (2.5)	16 (3.6)	a0.377
Joint pain	0 (0)	19 (3.7)	10 (2.2)	a0.326
Headache	0 (0)	20 (3.8)	8 (1.8)	a0.115
Forgetfulness	0 (0)	13 (2.5)	13 (2.9)	a0.680
Chest pain	3 (7.5)	5 (1.0)	9 (2.0)	**a0.015***
Leg pain	1 (2.5)	8 (1.5)	7 (1.6)	a0.643
Palpitations	2 (5.0)	4 (0.8)	5 (1.1)	a0.092
Muscle pain	0 (0)	1 (0.2)	6 (1.3)	a0.097
Other	1 (2.5)	50 (9.6)	46 (10.3)	a0.295

Data are shown as n (%). aFisher Freeman Halton Test

breath (65.6% ICU group, 42.6% ward group) and psychological problems (46.9% ICU group and 23.5% ward group) [7]. A prospective cohort study of 131 COVID-19 patients after discharge from a clinic in Wuhan by Wang *et al*. [8] showed that 86% of patients had no symptoms 3 to 4 weeks after discharge, while only 1.5% were identified to have dyspnea. Tenforde *et al*. [9] performed a telephone survey of symptomatic COVID-19 patients not admitted to hospital and identified 35% had not returned to their normal health level and had permanent symptoms like fatigue, cough and headache. A study by Huang *et al*. [10] investigating a total of 1655 post-COVID cases found the most frequent symptoms were fatigue or muscle weakness affecting 63% and sleep difficulties affecting 26%. A study by Peterson *et al*. [11] of 180 participants without clinical follow-up reported that 53.1% still had at least one symptom mean 125 days after the onset of symptoms. Of participants, 33.3% were identified to have one or two symptoms and 19.4% had three or more symptoms. The most common permanent symptoms were fatigue, loss of taste and smell and arthralgia [11]. During the post-COVID period, Karaaslan *et al*. [12] showed that 31% had fatigue, 18% had joint

pain and 15% had myalgia, while other COVID-19 symptoms included 25.3% shortness of breath and 20% hair loss in their study. Kayaaslan *et al*. [13] showed fatigue/tiring easily, myalgia and weight loss were the most frequently seen permanent symptoms (generally 29.3%) while respiratory symptoms had 2nd-highest frequency (25.4%).

In our study, the most frequent persistent symptoms were fatigue, shortness of breath, back and low back pain, loss of taste/smell, cough, joint pain, headache, forgetfulness, chest pain, leg pain, palpitations and muscle pain. With varying rates and rankings, tiredness-fatigue, shortness of breath and cough were the most frequent post-COVID persistent symptoms as supported in studies by Mandal *et al*. [6], Halpin *et al*. [7], Wang *et al*. [8], Tenforde *et al*. [9], Huang *et al*. [10], and Peterson *et al*. [11]. The first of these studies by Carfi *et al*. [5] overlaps in general with the most frequent persistent symptoms in studies from all around the world. In Turkey, Karaaslan *et al*. [12] and Kayaaslan *et al*. [13] reported the most frequent symptom was fatigue. No study contradicting these studies was encountered. We identified that 58.3% of cases did not have any symptom, while

41.7% had at least one persistent symptom. As our study included adequate numbers of cases with at least 120 days since recovery from viremia, we identified lower rates of tiredness-fatigue, shortness of breath and cough symptoms compared to the literature. At the same time, we observed that more than half of cases had full symptomatic recovery by benchmarking this duration. Previous studies are generally observed to keep the post-COVID duration shorter. As our study data belong to a longer period, we believe they reflect objective outcomes related to the post-COVID process.

In our study, different to the general literature, the 3rd most common persistent symptom was back and low back pain. Similarly, forgetfulness (2.6%) was encountered with higher frequency in our study. Cases rarely mentioned (< 0.5%) diarrhea, sweating, aggression, nasal blockage, loss of appetite, pollacuria, insomnia, numbness of distal extremities, edema of the legs, non-healing oral aphthous, feeling of pressure in head and chest, epigastric pain, regurgitation, vertigo, effort dyspnea, hair loss, toothache, hallucinations, facial pain, dry throat, miliaria skin rash, itching, night sweats, breast pain, atopia, ear pain, muscle cramps, confusion, nasal rhinitis, burning eyes, hypoglycemia attacks, hoarseness, and oily skin among persistent symptoms.

In our study, one COVID-19 case with rheumatoid arthritis diagnosis reported an acute attack after viremia, while a case with restless leg syndrome reported increased severity and frequency of symptoms after viremia. There is no literature data related to these two clinical situations.

Additionally, there were patients with newly-diagnosed DM, HT, pulmonary embolism, panic attack, asthma and Hashimoto disease in the post-COVID period. There are studies related to development of panic disorder [14], Hashimoto thyroiditis [15] and pulmonary embolism [16] in the post-COVID period, but there is inadequate literature data related to DM, HT and asthma newly developing in this period. We think patients with new DM diagnosis in the post-COVID period may be the effect of steroids administered during the disease period.

Of our cases, 35.9% had at least one comorbid disease. The most frequent chronic diseases were HT (14.7%), DM (12.3%) and COPD-coronary artery disease (3.8%). There are studies reporting that the pres-

ence of chronic disease and multiple morbidities reduces quality of life [17]. The most common comorbidities in the literature were observed to be hypertension (15.8%), cardiovascular and cerebrovascular situations (11.7%) and diabetes mellitus (9.4%) [18-20]. A meta-analysis including 61 studies emphasized that there was strong epidemiological evidence for the association of comorbidities with COVID-19 severity and prognosis [21].

While 4% of cases were infected with SARS-CoV-2 during the 1st wave, 44.3% during the 2nd wave and 51.7% during the 3rd wave, statistical differences were not observed between the sex, age, height, weight, BMI values, smoking habits and presence of comorbidities between the pandemic periods for our cases. The rates of those vaccinated who were infected with COVID in the 2nd wave was higher than during the 3rd wave ($p < 0.01$). We believe this situation is due to the increase in awareness about the pandemic over time and the better adoption of general hygiene rules related to COVID-19 in society.

There were no statistically significant differences between the hospitalization and intensive care admission status, admission durations, total disease duration, initial complaints and persistent complaints of cases according to pandemic period.

Only the incidence of chest pain was observed to be statistically high for those infected with SARS-CoV-2 during the first wave. The different treatment protocols in the period of the first wave, the lack of vaccines, progression of the process and accumulation of literature data changed the treatment protocols over time. Linked to all these factors, cases infected during the 1st wave are thought to have developed pneumonia more. However, there is no literature data found to support our hypothesis.

The most common initial symptoms stated in the literature [22] were fever and cough at 71.5%, while in our study, fatigue (21.2%), fever (19.4%) and headache (19.1%) were observed to be proportionally different from the general literature.

Limitations

Our study assessed the post-COVID period and could not access sufficient data about strains in the COVID-19 period. We could have gained information about variants apart from the common strain in line with patient declarations. When assessing strains,

cases with PCR kit use, severe clinical findings and assessed in health organizations may have been examined. At the same time, cases with chest pain, shortness of breath and respiratory distress were not assessed with radiological images/ECHO in line with the design and scope of our study. Both situations comprise limitations in terms of our study.

CONCLUSION

In the literature there are articles in parallel to our study, though our study differs from others both in terms of the emerging results and the post-COVID findings that were not reported in other studies. For the first time, our study included persistent symptoms and findings. Strong aspects of our study are that participants were not asked closed and directive questions about persistent findings and that cases were not directed toward certain answers. The minimum 120 days since disease ensured a more objective assessment of the post-COVID process. In the literature, there is no article comparing the COVID-19 period and the 1st, 2nd and 3rd waves. This situation is the strongest aspect of our study. Our study included all patients infected with COVID-19 without regard to follow-up in intensive care/ward or without being admitted. Strong aspects of our study are that patients with clinical follow-up were monitored with very similar treatment protocols, access to results and disease progression for all cases in the information-communication system in our hospital, and assessment during the post-COVID period by the same pandemic experts in our hospital's clinics. The clinician group in our hospital worked in the internal medicine specialist ward, intensive care, clinic and emergency service since the start of the pandemic, employed primarily during the COVID-19 pandemic. The internal medicine clinics are the health branch most frequently attended due to symptoms linked to COVID in the post-COVID period. The results of our study are important in terms of reflecting clinical practices in internal medicine.

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