Chapter

Demographic, Clinical and Radiological Features of Healthcare Workers and Two Index Cases That Were Infected with COVID-19 (SARS-Cov-2)

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Abstract

To evaluate the index cases leading to the transmission of healthcare workers (HCWs) in Rize/Turkey Recep Tayyip Erdogan University Faculty of Medicine Education and Research Hospital with COVID-19 infection and the clinical features of infected HCWs. The first two COVID-19 test positive patients treated at Rize/Turkey between 10.03.2020 and 12.04.2020 and HCWs those who examined these two patients whose COVID-19 PCR test results were positive were included in this study. In Rize/Turkey, the first and second cases of positive COVID-19 which was recorded on 13.03.2020 on 25.03.2020, 27 HCWs (female, 63%, n = 17 and male, 37%, n = 10 and the mean age was 33.2 ± 6.9 years) who contacted during the treatment of these cases and became COVID-19 positive were examined. The median of symptom duration (days) of the HCWs was 5 days (range: 0–17 days). Fever, 55.6% (n = 15); malaise, 44.4% (n = 12); cough, 40.7% (n = 11); sore throat, 33.3% (n = 9); myalgia, 33.3% (n = 9); dyspnea, 14.8% (n = 4); diarrhea, 22.2% (n = 6); vomiting, 14.8% (n = 4); anosmia, 18.5% (n = 5); ageusia, 22.2% (n = 6) and headache, 37% (n = 10) of the cases. The rates of headache in female HCWs infected with COVID-19 were found to be significantly higher compared to men (52.9%). None of them had severe clinical situation requiring intensive care follow-up or acute respiratory distress syndrome (ARDS). Laboratory measurements of HCWs were carried out at the first when they had symptoms and when they recovered, and results were compared accordingly. The thorax computerized tomography (CT) findings of HCWs were normal in 74.1% (n = 20) of total. HCWs were initially affected by the COVID-19 pandemic. Early measures provided by the Health authorities, access to diagnosis and treatment, and the young age average in HCWs prevented severe outcomes such as severe clinical course and mortality at the beginning of the outbreak.

Keywords: COVID-19, healthcare workers, transmission, pandemic

1. Introduction

COVID 19 continues to threaten health of the humankind [1, 2]. COVID-19 is transmitted by close contact and droplets among people. However, airborne contamination may be possible under certain conditions and environments in which procedures or supportive treatments that produce aerosols are performed [3]. Those who are most at risk of getting this disease are those who have contact with the patient or those who provides care for them. Therefore, the protection of HCWs is considered as one of the top priorities [4–6].

In all countries with COVID-19 pandemic, the caught unaware staff was effective in the transmission, since the transmission dynamics of the COVID-19 virus was not fully known at the onset of the outbreak [7, 8]. With the reporting of the first cases, the protective equipment has been widespread used. The initial case diagnosis in our country were made with guides in the form of a history of international contact and clinical definitions [8, 9]. Recently, as of September 2020, 601 HCWs were positive for the COVID-19 test during the onset of the outbreak, and then it was reported as 7,428 health workers had been infected, which is around 6.5 percent of the total number of cases [10].

The cases reported by our HCWs in the first week concurrently with the general course of the country, there was no history of traveling abroad and there had not been aware of suspected contacts. The fact that there were 27 HCWs in the first month and the first two index cases and 4 HCWs in the second month supported this outcome. During the epidemy, HCWs are under tremendous stress. Working with personal protective equipment (PPE) and performing specific procedures are cumbersome and were not convenient [11, 12]. Despite all these difficulties it was necessity to use highly protective respirators such as N95 or P2/FFP2/FFP3 for HCWs. Employees' occupational health and safety should be given high priority and a uniform policy should be applied to use personal protective equipment to prevent infection [7].

We aimed to identify the clinical features of 27 HCWs who were in contact with the first two index cases infected with COVID-19 and compare them with previous studies.

2. Material and methods

After the first index cases were diagnosed, filiation and evaluation of concurrent symptomatic applicants were performed at the Infectious Diseases clinic. Retrospectively, clinical findings were classified as severe (1–14 days), moderate (1–7 days), and mild (no hospitalization days), considering the duration of symptoms, length of hospital stay, and treatment practices. Patients with possible SARS-CoV-2 infection were examined via real-time RT-PCR and next-generation sequencing laboratory techniques. This study was approved by the Ministry of Health of Turkey, Scientific Research Ethics Committee No: Ayse Erturk-2020-05-11T12_27_08 and local ethics committee RTEU Faculty of Medicine Rize/Turkey – No: 2020/82.

2.1 Statistical analysis

SPSS 17.0 (Chicago Inc., 2008) program was used in the analysis. Categorical variables were expressed in terms of frequency (n) and percent (%) and in arithmetic mean, standard deviation, median, minimum and maximum values. While the Student t-test was used for comparison of continuous distributors with

normal distribution, those without normal distribution were analyzed with the Mann–Whitney U test. Pearson-$\chi 2$ and Fisher's exact tests were used for categorical variables. Paired-t test and Wilcoxon signed rank tests were used to compare the first and second levels of laboratory measurement parameters. $P < 0.05$ was accepted as the level of significance.

3. Results

3.1 Features of index cases (patients)

Characteristics of a 75-year-old female patient who was reported as the first COVID-19 test positive patient in Rize on 13.03.2020, and a 69-year-old male patient who was positive on the tracheal aspirate COVID-19 test on 25.03.2020 were summarized as follows:

3.1.1 The Index patient 1

75 years-old, women. Place of birth and living: Rize province. The first-degree relative lives in Istanbul province. With the symptoms of fever, cough, shortness of breath, vomiting, chest pain, F.T was admitted to emergency service of Rize State Hospital on 10.03.2020 and she was hospitalized with diagnoses of primary hypertension (HT), congestive heart failure (CHF), acute sub-endocardial myocardial infarction (MI), non-ST elevated acute myocardial infarction (AMI), and acute renal failure (ARF). On 13.03.20, she was transferred to the RTEU Training and Research Hospital Cardiology service. On 13.03.2020, the patient's nasopharyngeal COVID-19 sampling was performed. The patient was started on hydroxychloroquine 2x400 mg loading and 2x200 mg/day maintenance doses (po), azithromycin 1x500 mg/day (po), oseltamivir 2x30 mg/day (po), and piperacillin-tazobactam 4x3.375 g (1.5 flacon) iv treatment. On the date of 22.03.2020, she was transferred 1st stage coronary intensive care unit and intubated due to the deterioration in general condition, unconsciousness, hypotension, bradycardia, cyanosis, and decreased urine output.

Radiologically, there was no apparent opacity on the The posteroanterior (PA) chest X-ray dated 16.03.2020 (**Figure 1a**). Newly developed opacities in the right lung were noticeable on the control radiography dated 23.03.2020 (**Figure 1b**). In the IV contrast-free axial CT section dated 24.03.2020, ground-glass opacities (GGOs) were observed in the upper lobes, and an endobronchial intubation tube was present in the trachea (**Figure 1c**).

On 25.03.2020 and 29.03 2020, patient's endotracheal aspirate (ETA)-COVID-19 test resulted in positive. There was no overseas contact history. However, there was, a history of contact with the positive case (daughter), who was living in Istanbul and detected her positivity in RTEU hospital. Unfortunately, patient died on 30.03.2020.

While being followed up in the cardiology service and coronary intensive care unit, the staff working in these units was thought to have been transmitted.

3.1.2 The Index patient 1 and the expanse GGOs on CT

Radiologically, there was no apparent opacity on the PA chest X-ray dated 16.03.2020 (**Figure 1a**). Newly developed opacities in the right lung were noticeable on the control radiograph dated 23.03.2020 (**Figure 1b**). In the IV contrast-free axial CT section dated 24.03.2020, GGOs were observed in the upper lobes, and an endobronchial intubation tube was present in the trachea (**Figure 1c**).

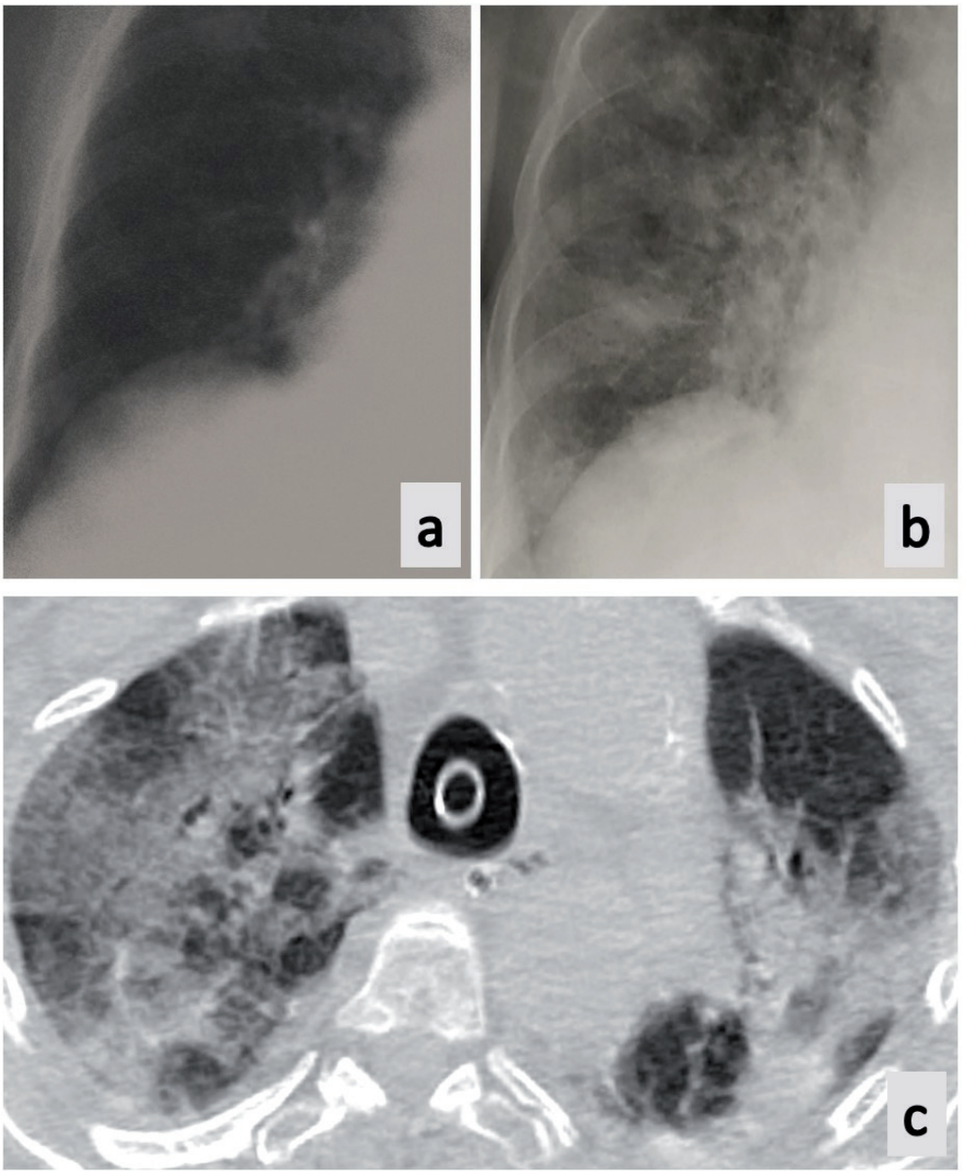

Figure 1.
(a–c) Radiologically, there was no apparent opacity on the PA chest X-ray dated 16.03.2020 (a). Newly developed opacities in the right lung were noticeable on the control radiograph dated 23.03.2020 (b). In the IV contrast-free axial CT section dated 24.03.2020, GGOs were observed in the upper lobes, and an endobronchial intubation tube was present in the trachea (c).

3.1.3 The Index patient 2

69 years-old, male. On 16.03.2020, he was hospitalized to the Pulmonology clinic with the diagnoses of hyperlipidemia, essential (primary) hypertension (HT), atherosclerotic heart disease, pacemaker use, and myalgia. There were 20 packs per month of smoking history for 25 years. The patient, whose preliminary diagnosis of viral pneumonia was interned, had a history of cough and sputum for 2 months, and had a fever since the last 3 days, lymphopenia, higher levels of CRP and D-dimer. SO_2 levels were around 80 receiving with 6 lt/min O_2 support and his tachypnea continued.

With prediagnosis of COVID-19, the nasopharyngeal (NF)-COVID-19 test performed on the same day was negative and this negativity continued the second NF-COVID-19 test carried on 20.03.2020. Patients' endotracheal aspirate (ETA)-COVID-19 test examined on 24.03.2020 was also negative.

Radiological findings of the patient were the following; Peripheral ground-glass areas were detected in the axial Pulmonary CT Angiography section dated

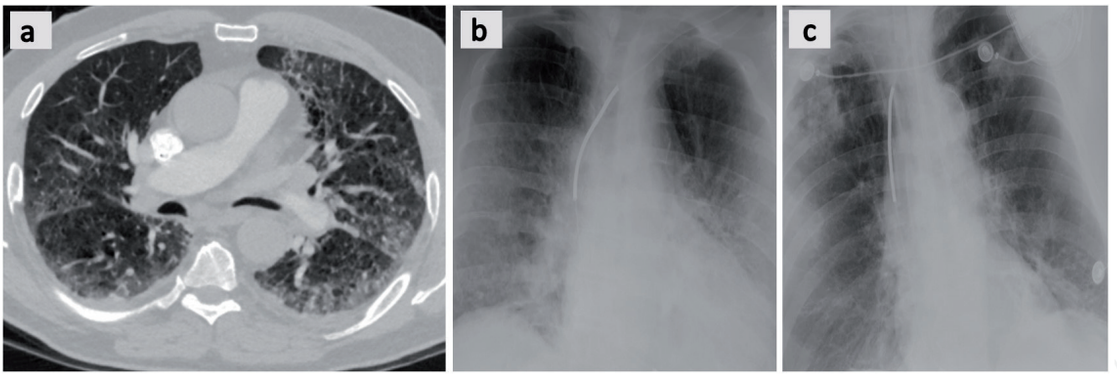

Figure 2.
(a-c) Radiological findings of the patient was the following; peripheral GGOs were detected in the axial pulmonary CT angiography section dated 19.03.2020 (a). Reticulonodular opacities were present on the PA chest x-ray of the same date (b). Newly developed opacities were detected in both lung upper lobes on the control graph taken on 4.04.2020. Electrodes and pacemaker were displayed in the left pectoral region (c).

19.03.2020 (**Figure 2a**). Reticulonodular opacities were present on the PA chest x-ray of the same date (**Figure 2b**). Newly developed opacities were detected in both lung upper lobes on the control graph taken on 4.04.2020 (**Figure 2c**).

On 25.03.2020, the patient's ETA COVID-19 test was found as positive and the case was recorded as the second COVID-19 case of Rize province. The patient diagnosed by COVID-19 via clinical and radiological imaging findings and was given hydroxychloroquine 2x400 mg loading and 2x200 mg/day maintenance doses (po), azithromycin 1x500 mg/day (po), oseltamivir 2x30 mg/day (po), piperacillin tazobactam 4x3.375 g (1.5 flacons) iv route. He, unfortunately, died on 10.04.2020.

While the patient was followed up by clinics of pulmonology and infectious diseases, it was thought that the personnel working in these units caught infection.

3.1.4 The Index patient 2 and the expanse peripheral GGOs on CT

Radiological findings of the patient was the following; Peripheral GGOs were detected in the axial Pulmonary CT Angiography section dated 19.03.2020 (**Figure 2a**). Reticulonodular opacities were present on the PA chest x-ray of the same date (**Figure 2b**). Newly developed opacities were detected in both lung upper lobes on the control graph taken on 4.04.2020. Electrodes and pacemaker were displayed in the left pectoral region (**Figure 2c**).

3.2 Demographic and clinical features of health personnel

COVID-19 positive health workers among them were 27 and 63% (n = 17) of them were women and 37% (n = 10) were men and the mean age was 33.2 ± 6.9 years. Of 55.6% (n = 15) cases were from Coronary ICU, 25.9% (n = 7) of them from Cardiology, and 18.5% (n = 5) of them from Infectious diseases clinic's personnel. Occupational distributions of cases were follows; 51.9% (n = 14) were nurses, 29.6% (n = 8) were doctors, 11.1% (n = 3) were cleaning staff and 7.4% (n = 2) were secretaries. Male doctors were found to be significantly higher than female doctors (70% vs. 5.9%, $p < .001$, Fisher's exact test, see (**Table 1**).

Clinically, patients with symptoms including at least one symptom were 74.1% (n = 20). None of the HCWs had comorbidity. While 63% of the cases (n = 17) had a mild clinical level, 29.6% (n = 8) were of moderate and 7.4% (n = 2) were severe. None of them had severe clinical outcome and acute respiratory distress syndrome

	Total	**Females**	**Males**	**Statistics**	
	n = 27	**n = 17**	**n = 10**	**t, z, or $\chi 2$**	**p value**
Age (years)[a]	33.2 (6.9)	32.3 (6.8)	34.7 (7.3)	−.838	.410
Occupations, n (%)				15.901*	.000
Nurse	14 (51.9)	13 (76.5)	1 (10.0)		
Doctor	8 (29.6)	1 (5.9)	7 (70.0)		
Cleaning stuff	3 (11.1)	1 (5.9)	2 (20.0)		
Sekretary	2 (7.4)	2 (11.8)	0		
Working service, n (%)				1.318*	.647
Coronary	15 (55.6)	8 (47.1)	7 (70.0)		
Cardiology	7 (25.9)	5 (29.4)	2 (20.0)		
Infectious diseases	5 (18.5)	4 (23.5)	1 (10.0)		
First PCR positivity (day)[b]	2 (0–7)	3 (0–7)	0 (0–4)	−1.594	.111
1st PCR negativity (day)[b]	7 (0–12)	8 (0–12)	6 (5–10)	−1.384	.167
2nd PCR negativity (day)[b]	10 (7–15)	10 (7–15)	10 (7–15)	−.627	.531
Symptom presence (at least one), n (%)	20 (74.1)	13 (76.5)	7 (70.0)	.137*	1.00
COVID-contact, n (%)				2.830*	.124
Knew	11 (40.7)	9 (52.9)	2 (20.0)		
Not-knew	16 (59.3)	8 (47.1)	8 (80.0)		
Hospitalization (day)[b]	0 (0–15)	0 (0–14)	0 (0–15)	−.116	.908
Clinic severity, n (%)				1.478*	.578
Good	17 (63.0)	12 (70.6)	5 (50.0)		
Moderate	8 (29.6)	4 (23.5)	4 (40.0)		
Severe	2 (7.4)	1 (5.9)	1 (10.0)		
Symptoms duration (day)[b]	5 (0–17)	4 (0–13)	7 (0–17)	−1.295	.195
Symptoms presence, n (%)					
Fever	15 (55.6)	9 (52.9)	6 (60.0)	.127*	1.00
Cough	11 (40.7)	5 (29.4)	6 (60.0)	2.440*	.224
Sore throat	9 (33.3)	5 (29.4)	4 (40.0)	.318*	.683
Shortness of breath	4 (14.8)	2 (11.8)	2 (20.0)	.338*	.613
Miyalgia	9 (33.3)	6 (35.3)	3 (30.0)	.079*	1.00
Malaise	12 (44.4)	19 (58.8)	2 (20.0)	3.844*	.107

	Total	Females	Males	Statistics	
	n = 27	**n = 17**	**n = 10**	**t, z, or $\chi 2$**	**p value**
Headache	10 (37.0)	9 (52.9)	1 (10.0)	4.979*	**.042**
Diarrhea	6 (22.2)	5 (29.4)	1 (10.0)	1.373*	.363
Vomiting	4 (14.8)	4 (23.5)	0	2.762*	.264
Loss of smell	5 (18.5)	3 (17.6)	2 (20.0)	.023*	1.00
Loss of taste	6 (22.2)	4 (23.5)	2 (20.0)	.045*	1.00
Smoking (Yes), n (%)	5 (18.5)	0	5 (50.0)	10.432*	**.003**
CT findings (Yes), n (%)	7 (25.9)	4 (23.5)	3 (30.0)	.137*	1.00
Reversed halo (Yes), n (%)	2 (7.4)	1 (5.9)	1 (10.0)	.156*	1.00
Frosted-glass opacity (Yes), n (%)	7 (25.9)	4 (23.5)	3 (30.0)	.137*	1.00
Consolidation (Yes), n (%)	1 (3.7)	0	1 (10.0)	1.765*	.370
Bilaterally involvement (Yes), n (%)	2 (7.4)	0	2 (20.0)	3.672*	.128
Peripheral and dorsal (Yes), n (%)	7 (25.9)	4 (23.5)	3 (30.0)	.137*	1.00
Middle and lower zones (Yes), n (%)	5 (18.5)	3 (17.6)	2 (20.0)	.023*	1.00

[a]*Mean (standard deviation)*
[b]*Median (minimum-maximum)*
[*]*Fisher's exact test*
CT: computerized tomography.

Table 1.
Descriptives of health personnel infected with COVID-19 in terms of gender.

(ARDS) requiring intensive care follow-up. While 40.7% (n = 11) of the cases knew COVID-contact, 59.3% (n = 16) did not. The hospitalization value (days) of the patients was in the range 0–15.

The findings were classified as severe (1–14 days), moderate (1–7 days), and mild (no hospitalization days) considering the duration of symptoms, length of hospital stay, and treatment practices. Milddefines, very close to asymptomatic patients who received only hydroxychloroquine therapy whereas moderate defines, symptomatic findings were evident, those who received hydroxychloroquine and azithromycin therapy followed in hospital and severe means, respiratory symptoms were severe, supportive therapy- receiving oxygen, hydroxychloroquine- azithromycin and favipiravir therapy.

While the CT findings of the HCW were normal in 74.1% (n = 20), the appearance of ground glass was found in 25.9% (n = 7), reversed halo or atoll sign was found in 7.4% (n = 2), consolidation was present in 3.7% of the cases (n = 1). Bilaterally involvement was detected in 7.4% of the cases (n = 2), peripheral and dorsal involvement in 25.9% of the cases (n = 7). The involvement of the middle and sub-zones was detected in 18.5% (n = 5) of the cases. Especially in the female gender, 76.5% (n = 13) of them had normal CT findings (see **Table 1**).

3.3 Comparison of laboratory measurements

The laboratory measurements of the patients in the first week of admission were compared with the test results when the patients were discharged from the hospital or re-admitted for control (second week). Laboratory measurements of HCWs were carried out at the first when they had symptoms and the second when they healed, and results were compared. A significant reduction was found

between the mean PLT (238.3 vs. 204.310^3/μL; z = −2.858, p = .004), MPV (10.0 vs. 9.5 fL; z = −2.161, p = .031), CRP (2.9 vs. 1 g/dL; z = −2.490, p = .013), Hgb (13.5 vs. 13.1 g/dL; z = −2.300, p = .021), LDH (91.1 vs. 47.2 U/L; z = −4.542, p < .001), CK (77 vs. 60 U/L; z = −3.340, p = .001), CK-MB (0.8 vs. 0.5 mg/mL; z = −2.212, p = .027), troponin (all second examinations were < 3.2, z = −2.032, p = .042), ferritin (151.7 vs. 95 ng/mL; z = −2.822, p = .005) levels whereas a significant increase was found the mean albumin (43.8 vs. 44.4 g/L; z = −2.000, p = .046), K^+ (4.1 vs. 4.3 mmol/L; t(26) = −2.213, p = .036) and Na^+ (137.5 vs. 138.2 mmol/L; t(26) = −2.174, p = .039) levels. The D-dimer had increased in 2 poor-clinical findings of HCWs, but their mean values were within normal limits (see **Table 2**).

	Laboratory measurements[a]		**Statistics**	
	First	**Second**	**paired-t or z**	**p value**
WBC (10^3/μL) (N: 4–10)	6.3 (1.3)	6.3 (1.5)	−.102	.919
NE (%) (N: 50–70)	61.5 (9.7)	58.4 (8.8)	−1.765	.078
LY (%) (N: 20–40)	31.4 (9.8)	28.9 (8.5)	−1.105	.269
N/L ratio	2.3 (1.6)	2.2 (0.8)	−.288	.773
PLT (10^3/μL) (N: 100–400)	238.3 (43.0)	204.3 (46.5)	−2.858	.004
MPV (fL) (N: 6.5–12)	10.0 (1.1)	9.5 (0.8)	−2.161	.031
PDW (fL) (N: 15–17)	16.0 (0.3)	16.1 (0.3)	−.345	.730
Hb (g/dL) (N: 10–16)	13.5 (1.1)	13.1 (1.2)	−2.300	.021
APTT (sec) (N: 26–38)	29.1 (2.4)	28.7 (1.9)	−.170	.865
PT (sec) (N: 12–16.5)	13.7 (2.5)	13.1 (0.7)	−.787	.432
CRP (mg/L)[b] (N: 0–5)	2.9 (0.4–114)	1 (0.3–16.7)	−2.490	.013
AST (U/L) (N: 0–35)	21.4 (5.7)	20.4 (6.7)	−.994	.320
ALT (U/L) (N: 0–35)	19.8 (0.9)	23.6 (11.7)	−1.828	.068
LDH (U/L) (N: 0–248)	191.1 (56.1)	47.2 (4.0)	−4.542	.000
Albumin (g/L) (N: 35–52)	43.8 (3.3)	44.4 (2.9)	−2.000	.046
K (mmol/L)[a] (N: 3.5–5.1)	4.1 (0.4)	4.3 (0.4)	−2.213	.036
Na (mmol/L)[a] (N: 136–146)	137.5 (2.4)	138.2 (1.9)	−2.174	.039
Cre (mg/dL) (N: 0.51–0.95)	0.6 (0.1)	0.6 (0.1)	−.294	.769
CK (U/L)[b] (N: 0–145)	77 (55–684)	60 (35–136)	−3.340	.001
CK-MB (mg/mL) (N: 0–3.1)	0.8 (0.6)	0.5 (0.1)	−2.212	.027
Troponin (pg/mL)[b] (N: 0–15.6)	<3.2 (<3.2–7.9)	<3.2	−2.032	.042
D-dimer (μgFEU/mL) (N: 0–0.5)	<.25 (<.25–0.3)	<.25	−1.890	.059
Sedim (mm/hour) (N: 0–20)	19.2 (17.9)	13.1 (7.7)	−1.298	.194
Ferritin (ng/mL) (N: 21.8–274.6)	151.7 (115.7)	95.0 (38.8)	−2.822	.005

[a]Mean (standard deviation)
[b]Median (minimum-maksimum)
N: normal reference range; WBC: White blood cell; NE: neutrophil; LY: lymphocyte; N/L: neutrophil/lymphocyte; PLT: platelet.

Table 2.
Comparison of the first and second values of laboratory measurements.

3.4 Imaging findings

3.4.1 The HCW with the worst clinical findings and the expanse GGOs on CT

44 year old male patient, it was noteworthy that in the first examination (**Figure 3a**), the GGOs observed in the lower lobe of the left lung expanded in the control examination on iv non-contrasted axial CT images obtained with an interval of 4 days (**Figure 3b**). In the control evaluation in the ground glass area (**Figure 3c**) located in the left lobe lower lobe posterobasal segment, fibrous bands developed (**Figure 3d**).

3.4.2 The HCW with good clinical findings and the halo sign on CT

41 year old female patient, in the CT images of 31.03.2020 (**Figure 4a**) and 5.05.2020 (**Figure 4b**), the minimum-intensity-projection coronal cross-sectional CT images show different areas of involvement. Right lung lower lobe findings (**Figure 4a**) declined in control, but consolidation developed with a reverse halo sign in posterobasal (**Figure 4b**).

3.4.3 The HCW with asymptomatic clinical findings and the minimal peripheral GGOs on CT

34-year-old female patient, peripheral small-sized GGOs are observed in the iv non-contrasted axial CT images obtained every 10 days apart (**Figure 5a**). The GGOswere diminished but new ground glass areas developed (**Figure 5b**).

4. Discussion

In many countries, especially China, which is the country where the COVID-19 epidemic was first seen, the healthcare professionals became the "frontline" occupational group struggling against COVID-19 [13–15]. According to the first date of February 11, 2020, 1716 Chinese HCWs have been reported to have COVID-19 infection when the first 15 affected cases were reported in Wuhan [13]. On February 17, 2020, the CDC weekly report reported that a total of 3,019 Chinese HCWs were infected with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and 1,716 of them were confirmed with COVID-19. As of February 20, ten health workers died [16]. Reasons why healthcare professionals get an increasing number of infections were the following; 1) People who are unaware of the disease and epidemic are transmitted to HCWs who do not have protective clothing when they return to their place of residence, 2) Inadequate protective equipment supply especially for primary HCWs in primary care, and 3) Computed tomography (CT) scan results before COVID-19 case definition criteria are not specified and then it was later seen as sudden changes in the criteria [13, 14].

After the first case reported in Turkey and the Ministry of Health have published the management and treatment algorithm guides. The possible case and the definite case definitions were made by them and HCWs were informed. The use of protective equipment was recommended by the Governments [17, 18]. In the Rize province, which was 1150 km away since the first cases originated from Istanbul, 16 (59.3%) of the HCWs did not have awareness about index cases. The use of surgical masks was widespread among the staff, but the mask use of the patient and accompanying people to patients weremissing, and the highly protective respiratory mask

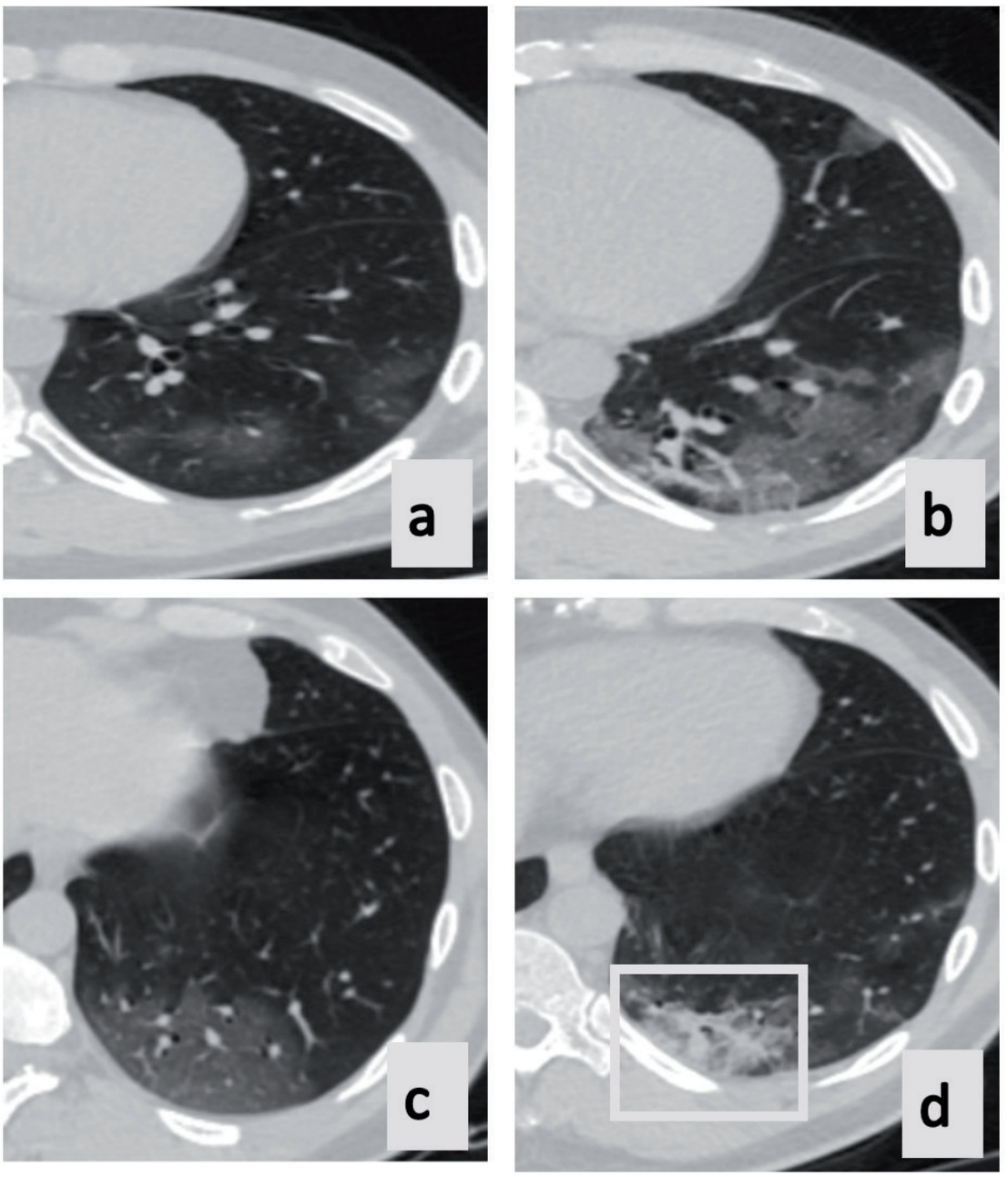

Figure 3.
(a-d) 44 year old male patient, it was noteworthy that in the first examination (a), the GGOs observed in the lower lobe of the left lung expanded in the control examination on iv non-contrasted axial CT images obtained with an interval of 4 days (b). In the control evaluation in the ground glass area (c) located in the left lobe lower lobe posterobasal segment, fibrous bands developed (d).

was used in case of intubation. While 63% of the cases (n = 17) had a mild clinical level, 29.6% (n = 8) were moderate and 7.4% (n = 2) were severe. Index 2 case had comorbidities and died but there was no severe clinical condition such as ARDS or death among the medical staff which were in contact with her.

In our study, the mean age of the total 27 HCW was 33.2 ± 6.9 years. The median age was 39 (IQR: 32–48.5 years) in studies conducted in health workers in China [19] the age ranges of 72 HCWs, 33 of whom were at high-risk Section 39 and general departments were 21–66 years [13]. It was similar to the report showing the age of 41 (IQR: 32–52 years) from Zhejiang province in the first studies [20]. The average age in the local study of Wuhan, the starting place of the outbreak, was 56 (IQR: 42–68 years) [21]. In another study conducted in Wuhan, the average age was 49.0 (IQR 41.0–58.0) [22]. In our study, 63% (n = 17) of the 27 health personnel were

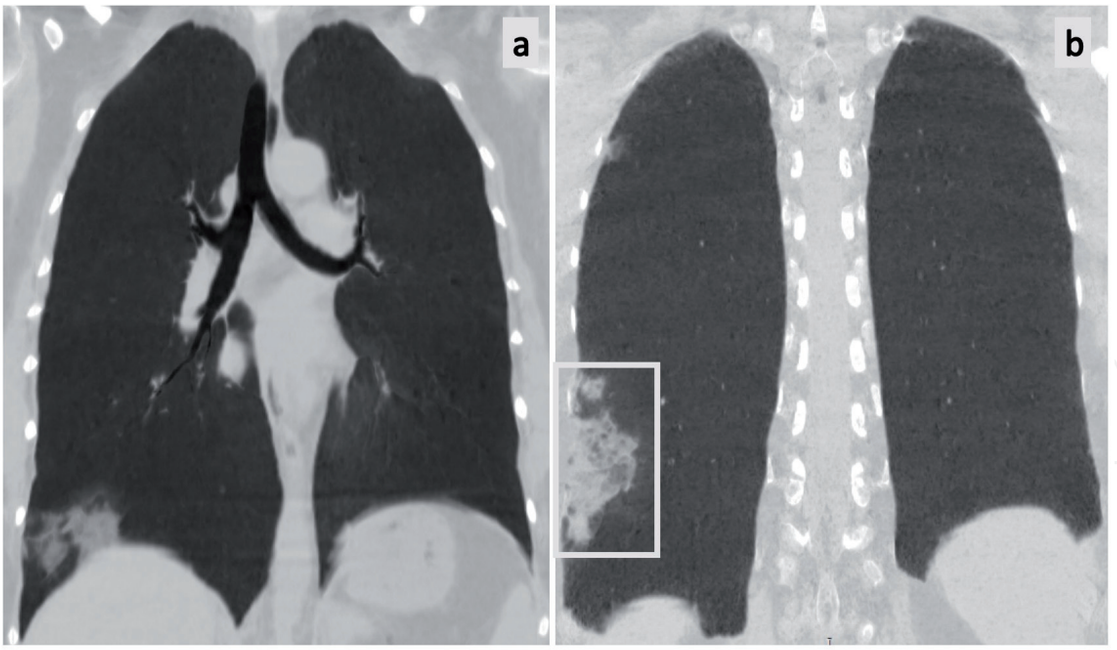

Figure 4.
(a-d) 41 year old female patient, in the CT images of 31.03.2020 (a) and 5.05.2020 (b), the minimum-intensity-projection coronal cross-sectional CT images show different areas of involvement. Right lung lower lobe findings (a) declined in control, but consolidation developed with a reverse halo sign in posterobasal (b).

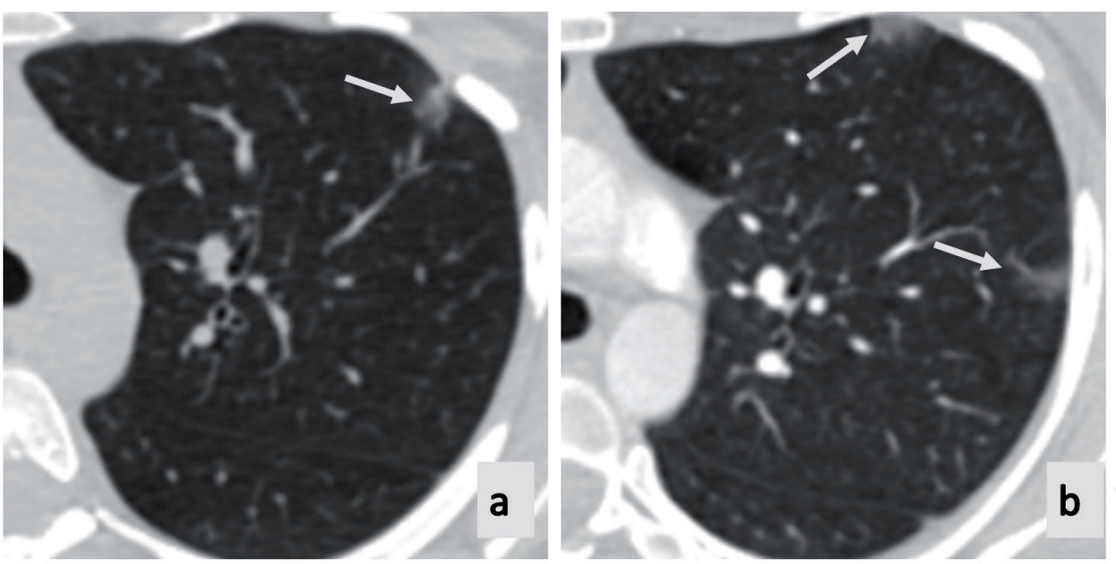

Figure 5.
(a, b) 34-year-old female patient, peripheral small-sized GGOs are observed in the iv non-contrasted axial CT images obtained every 10 days apart (a). The GGOswere diminished but new ground glass areas developed (b).

female and 37% (n = 10) were male and Wang et al. reported that female patients constituted the majority of all cases (61.25%), the male ratio was (38.75%) [19]. Ran et al. showed that the genders were similar ($\chi 2 = 2.243$, $p = 0.134$) [13]. In other studies conducted in Wuhan, most of the infected patients were men 30/41 (73%), and (54.3%) were male [15, 21], respectively. Most of our HCW cases were high-risk departments workers, such as coronary intensive care. It was found similar to the study conducted in Wuhan [13]. In our study, 51.9% (n = 14) of the infected profession group were female nurses and 13 (76.5%) were among the nurses. It was similar to the work of Wang et al. [19] the ratio as 41/80 (51.25%). In the comparison between doctors in our study, male doctors were found to be significantly

higher than female doctors (70% vs. 5.9%, $p < .001$). It was observed that thorax CT findings were normal in the female gender.

In our study, none of the healthcare professionals had comorbidity. The clinic of 63% (n = 17) of the cases was followed up with outpatient home isolation. Wang D et al., also constituted a significant number of HCWs in the majority of non-intensive care patients ($p < .001$) [21]. However, having a non-intensive care follow-up suggested that they were clinically mild. In previous studies, it was shown that this infection may cause severe clinical picture in non-comorbid patients, however hypertension, diabetes, cardiovascular, chronic obstructive pulmonary diseases, liver, and kidney failure are risk-causing comorbidities [15, 19–21].

The most common clinical symptoms in our study were present in 55.6% (n = 15) of fever and 40.7% (n = 11) of cough, respectively, less than the signs of fever and cough in previous studies [15, 19–21]. Chinese cases showed more severe clinical. Fever was seen at a relatively low rate in the European studies which were more extensive studies and they included mild to moderate COVID-19 (45.7% and 48%) [23, 24]. The cough was reported at high rates in European studies (63.2 and 80%) [22, 23]. Shortness of breath was present in 14.8% of the cases (n = 4), which was less than the previous study results [15, 21–23]. In our study, the complaint of malaise was present in 44.4% of the cases (n = 12) and myalgia in 33.3% (n = 9), this rate was higher than that of the health workers in Wuhan-China [19] compared to other studies [15, 20–23] was less. The low levels of these findings may be since most of the clinical conditions are good-moderate or the number of cases was limited. According to clinical studies in Asia [15, 19–21], the most common symptoms were fever, cough, shortness of breath, muscle pain, arthralgia, headache, diarrhea. With the spread of COVID-19 in Europe, he emphasized a new atypical presentation of the disease: smell and taste dysfunction [22–27].

In our study, anosmia was detected in 18.5% of the cases (n = 5) and complaints about the sense of taste in 22.2% of the cases (n = 6). Taste and smell tests were not performed, only the presence of symptoms was said by the staff themselves, similar to the previous studies [24]. The rate of anosmia in Europe was shown to be in 201 patients (14.2%) [22]. Even in a more comprehensive study of 2428 patient series, 74% of the 80 subjects tested were positive despite limited access. Cases; only 51% reported their symptoms as cough or fever, while 16% reported it as isolated anosmia as an isolated symptom [25]. Another recent study reported that anosmia was recorded in 73% of patients and the first symptom in 26.6% before the diagnosis of COVID-19 [26]. In the European study (54.2%) there was a taste impairment [22]. In a study of 417 mild to moderate COVID-19 patients in European hospitals, 85.6% and 88.0% of the patients reported smell and taste impairment and a significant relationship between both disorders ($p < 0.001$) [23]. It has been argued that the reason for sensory loss may be due to neurotropic and neuroinvasive coronaviruses [27]. In our study, headache complaints were found in 37% of the cases (n = 10), and headache rates in female HCWs infected with COVID-19 were found to be significantly higher than men (52.9% vs. 10%, $p = .042$, Fisher's exact test). All other complaints except for headaches were found in male and female workers at similar rates ($p > .05$ for all).

While it was 21/62 (34%) (2021) close to our study in Zhejiang provincial, it was lower in studies from Wuhan; The most comprehensive study on 138 patients Wang D et all. Headache was 6.5% in 9 people in total (15, 19–21). But in the more extensive European mild to moderate Coronavirus Disease 2019 study, this rate was much higher. The most common symptom was reported asheadache (70.3%) [22]. Diarrhea, another symptom in our study, was in 22.2% (n = 6) of the cases. In two studies [19, 21] involving health workers in China (80 and 138 cases), it was 18.75% and 10.1%, respectively, in other studies, the rate was reported to be much (3–8%)

less [15, 20]. In European studies, it was 473/1420 (38.1%) [22] and 50% [23]. In our study, vomiting was reported in 14.8% of the cases (n = 4), less in Chinese studies [21, 22], and in European studies at a similar rate [22, 23].

As laboratory parameters; WBC, neutrophil, and lymphocyte levels were normal. However, the decrease in PLT, MPV, hemoglobin levels in the first and last measurements in hospital admission was found significant.

From the place where the outbreak and clinical findings were severe, for instance, Huang C. et al. reported 25% leukopenia and 63% lymphopenia [15]. In the Chinese HCWs study, 19 of 80 patients (23.75%) had leukopenia and 38 (47.5%) had lymphopenia [19]. In the Zhejiang province study, there was leukopenia and 42% lymphopenia at 31% at the time of admission [20]. Wang et al. showed that although the total of 138 patients was within normal limits, white blood cell and neutrophil counts were significantly higher in intensive care patients [21]. In our study, neutrophil/lymphocyte rate (NLR) was normal, as the clinical well-being ratio of HCWs was high. In the study in which they compared mild type and severe-critical patient groups in China, NLR was the most useful prognostic factor affecting prognosis in patients with a severe disease with COVID-19 pneumonia. In the severe group, the blood neutrophil count was higher than in the mild group, the blood lymphocyte count was significantly lower, and the bacterial infection rate increased significantly [28]. When the results of many studies in China were evaluated, high NLR was argued to be an independent prognostic biomarker for COVID-19 patients [29, 30]. Studies were reporting that MPV was elevated during the active period of some viral infection [31, 32]. In our study, it was noteworthy that the HCW was higher than the values of the first measurement MPV levels were higher than that of recovery period measurement (10.0 vs. 9.5; $z = -2.161$, $p = .031$).

In our study, mild elevation was found in two patients with moderate to severe pneumonia signs, and total D-dimer measurements were in the normal range and were similar to some Chinese studies [19, 20], but were high in intensive care patients in China [15, 21, 33]. Tang N et al. [34] showed that abnormal coagulation results, especially markedly elevated D-dimer and fibrin degradation product FDP, are common in deaths with new coronavirus pneumonia NCP (34).PLT levels were within normal limits in all studies, including intensive care patients [15, 19–21, 33]. Lippi G and Plebani M [33], reported that the country where the epidemic spread, increased C-reactive protein (CRP) and lactate dehydrogenase (LDH) in their letters, which summarize abnormal laboratory parameters, which are prognostic biomarkers in studies in most Wuhan studies in China, were shown as negative prognoses. In our study, a significant difference was found between the median value of the first and second CRP (g/dL) levels (2.9 vs. 1). Another significant difference was found between the mean first and second LDH (U/L) levels (91.1 vs. 47.2). A significant difference was found between the mean values of first and second albumin (g/L) levels in our cases (43.8 vs. 44.4). The value of troponin levels in the second measurement was found to be <3.2 in all cases. Although our cases showed clinically good to moderate clinics [34], they were consistent with the study. We found a significant difference between the first and second median CK (U/L) levels (77 vs. 60). A significant difference was found between the first CK-MB (mg/mL) of the cases and the second CK-MB (0.8 vs. 0.5). There was a significant difference between the mean values of the first ferritin (ng/mL) and the second ferritin (151.7 vs. 95).

Computed Tomography (CT) can help in diagnosis and differential diagnosis in patients with COVID-19 [35] and is particularly high when evaluated with serial CT images. RT-PCR provides a chance to catch 93% of negative patients earlier [36] history of contact, clinical findings, and imaging findings were considered more sensitive in the diagnosis of COVID-19 [36]. Typical radiological findings of COVID-19 pneumonia have been reported as interstitial inflammation, ground-glass opacities, crazy

paving appearance, and bilateral or multiple lobular or subsegmental widespread consolidation [19–21, 35–37]. In our study, pneumonia findings and CT findings were seen in 7 persons (25.9%) and in 20 subjects (74.1%), there was no CT involvement. The clinical progresses was good in HCWs at the beginning of the outbreak.

While not being aware of the cases initially caused contamination by contact, it may be related to the aerosol contact formed later by intubation. Nevertheless, the timely implementation of protective measures prevented negative consequences. The clinical reflection severity of the contamination was low, the radiological reflection was moderate, and the laboratory reflections were partly significant in HCWs. Acute respiratory distress syndrome (ARDS) was not seen in any healthcare worker.

In conclusion, HCWs are a respected professional group that must be at the forefront of the epidemic and the center of the risk. The risk decreases when the virus load is reduced using PPE. It would be also crucial to ensure that complete PPE, including the electrical air purification device, is fitted, providing a negative pressure isolation ward environment that prevents patients from spreading to the rest of the infectious pathogen.

Declaration of conflict of interest

All authors declare that there is no any type of conflict of interest regarding this study.

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