

Analysis of the Patients Who Admitted To A Turkish Emergency Department During COVID-19 Pandemic

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Abstract: *Background and aim:* In this study, it was aimed to review patients who presented to a Turkish emergency department (ED) with fever and at least one symptom and finding of acute respiratory infection (cough, shortness of breath) in Sisli Hamidiye Etfal Education and Research Hospital Tertiary Medical Care Center during COVID-19 pandemic. *Methods:* This retrospective, descriptive, observational study included patients presented between March 10, 2020 and April 25, 2020. The patients were classified into two groups according to RT-PCR test result: RT-PCR (+) and RT-PCR (-). The demographic characteristics and clinical endpoint-related factors were analyzed in the patients. *Results:* The study included 840 patients; 461 men (54.9%) and 379 women (45.1%). RT-PCR test was positive in 345 patients (41.0%). The most common comorbidity was hypertension (HT) in 119 patients (34.5%); followed by diabetes mellitus (DM) in 61 patients (18.3%). At time of ED presentation, there was mild clinical manifestation in 72.2%, whereas moderate in 21.7% and severe in 6.1% of patients with positive RT-PCR testing. Of the patients with positive RT-PCR testing, 64 patients (18.6%) were discharged from ED while 255 patients (73.9%) were admitted to COVID clinic and 26 were admitted to COVID intensive care unit (ICU). Of the patients admitted, 299 patients (86.7%) were discharged while 46 patients (13.3%) died due to multi-organ failure (MOF) (50%), acute respiratory distress syndrome (ARDS) (32.6%), acute pulmonary embolism (APE) (10.9%) and acute coronary syndrome (ACS) (6.5%).

Conclusions: The RT-PCR positivity rate seemed lower in our study when compared to literature. In addition, mortality rate was lower in our study when compared to other countries.

Keywords: COVID-19, RT-PCR, Emergency Department

Introduction

Initially, Zhu et al. reported a disease with unknown etiology which can cause pneumonia, ARDS or even death in Wuhan City of Hubei Province, China on December 31, 2019 (1). On January 7, 2020, it was found that the causative agent is a novel coronavirus (2019-nCoV) which hasn't been detected in human so far. Subsequently, the disease was designated as Coronavirus disease-19 (COVID-19) and

causative agent as SARS-Cov2 (2). It was reported that SARS-Cov2 belongs to coronavirus family and causes a clinical presentation similar to Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS) pandemics (1). It was proposed that the primary host is bats and that it could be transmitted to human from intermediate host, pangolins (3). The major feature of SARS-Cov2 is high infectivity. It is primarily transmitted through droplets occurring during cough, sneezing or speech.

On January 30, 2020, the World Health Organization (WHO) designated outbreak as international public health emergency. On March 11, 2020, WHO finally declared outbreak as pandemics given severity and viral spread in 113 country (4). On March 11, 2020, the first case was announced in Turkey by Health Ministry. During this period, many hospitals across Turkey were designated as Pandemic Hospital (5).

Because of the disease, governments have taken drastic measures like the quarantine of hundreds of millions of people worldwide. However, due to the large number of asymptomatic cases of COVID-19, these efforts are limited to the problem of discriminating between COVID-19 positive and negative individuals (6). In this study, it was aimed to assess demographic characteristics and clinical outcome in patients stratified as positive or negative according to RT-PCR result.

Methods

Eight hundred forty patients were included in this retrospective observational study. The study included patients who presented with fever and at least one symptom or finding of acute respiratory tract infection (cough, shortness of breath) to ED of Sisli Hamidiye Etfal Education and Research Hospital between March 10, 2020 and April 25, 2020 and underwent RT-PCR testing from nasopharynx and oropharynx as they fulfilled possible case definition for COVID-19. This study was approved by the Ethics Committee of the Health Science University Şişli Hamidiye Etfal Education and Research Hospital in Istanbul (approval number: 2760).

Patients older than 18 years of age who had symptoms (fever and respiratory symptoms such as cough and acute respiratory failure) of COVID-19 and who admitted to the ED were included in the study. Exclusion criteria were age <18 years old, patients with missing data and patients referred to another center. The diagnosis of SARS-CoV-2 was confirmed by RT-PCR in the nasopharyngeal and oropharyngeal swap samples. Only one nasopharyngeal (NP) and oropharyngeal (OP) swap sample was obtained from the patients with negative RT-PCR results and without

any indication of hospitalization in accordance with the guidelines of Turkish Ministry of Health and WHO and their follow up were conducted in accordance with these guidelines (7,8). The NP and OP swab samples were obtained by a special team including the specialists in microbiology and general practitioners.

Age, gender, emergency admission date, travel history, occupation, additional disease, ICU admission, length of hospital stay, mortality (survival or non-survival) data, and COVID-19 PCR results were scanned from the hospital automation system. Patients were divided into two groups as RT-PCR test result positive RT-PCR (+) and negative RT-PCR (-).

Clinical manifestations of the were classified according to the indications by the National Institutes of Health adopted from these indications (9). Mild cases were the patients who did not have pneumonia findings in computed tomography (CT) and that could be followed without hospitalization, mild cases were the patients who had pneumonia findings in CT and had fewer and respiratory symptoms and severe cases were the patients with dyspnea, respiratory frequency < 30 breaths per minute, SpO₂ < 93%, PaO₂ / FiO₂ < 300 and / or lung infiltrates > 50%.

Statistical Evaluation

Normally and abnormally distributed quantitative variables were compared using the Student's t test and the Mann-Whitney U test, respectively. Categorical variables were compared using the chi-square test. The results were given as the mean and standard deviation, median and interquartile range or frequency and percentage, wherever appropriate. Categorical and consecutive variables were evaluated by univariate logistic regression analysis for their ability to predict mortality. A *P* value of <.05 was considered statistically significant. Statistical analyses were performed using SPSS version 26.0.

Results

The study included 840 patients (461 men (54.9%) and 379 women (45.1%) without missing data who presented to ED with fever and at least one symptom

or finding of acute respiratory tract infection (cough, shortness of breath) and underwent RT-PCR testing as they fulfilled possible case definition. When patients were assessed according to confirmation by RT-PCR test, it was found that RT-PCR testing was positive in 345 patients (41.0%) while negative in 495 patients (59.0%). Mean age was significantly higher in RT-PCR (+) patients (55.5±17.3 years) compared to RT-PCR (-) patients (49.7±18.4 years) ($p<0.05$) (Table 1, Figure 1). RT-PCR(-) patients who were confirmed to have COVID-19 with CT findings and clinical manifestation received the treatment. In RT-PCR(+) cases, treatment was initiated immediately. Both



Figure 1: Age distribution of RT-PCR(+) and RT-PCR(-) patients

patient groups that were confirmed to have COVID-19 received hydroxychloroquine. Depending on the clinical prognosis, patients received favipiravir and in case of clinical picture gets worsen prognosis, patients received immune plasma treatment.

Of the RT-PCR (+) patients, 60.3% were men and 39.7% were women. There was significantly more male patients in RT-PCR (+) group compared to PCR-RT (-) group ($p<0.05$). There was history of foreign travel within prior 14 days in 2.0% of RT-PCR (+) patients and in 1.6% of RT-PCR (-) patients, indicating no significant difference between groups ($p>0.05$). Of the cases, 24.1% ($n=108$) were healthcare providers. The RT-PCR test was positive in 24.0% whereas negative in 76.0% of patients working at healthcare services. The proportion of healthcare providers were significantly lower in RT-PCR (+) group when compared to RT-PCR (-) ($p<0.05$). When assessed regarding medication, the most common drugs used were anti-hypertensive agents by 33.9% and anti-diabetic agents by 17.1%. The rates of medication, anti-hypertensive use and anti-diabetic use were significantly higher in RT-PCR (+) group than RT-PCR (-) group ($p<0.05$); however, there was no significant difference

in analgesic, anticoagulant, anti-arrhythmic agent and bronchodilator use ($p>0.05$) (Table 1).

When comorbidity was assessed, it was found that there was a comorbid disease in 51.6% of RT-PCR (+) patients whereas in 38.8% of RT-PCR (-) patients. The most common comorbidity was HT by 34.5%; followed DM by 18.3%. The rates of comorbidity, HT, DM and malignancy were significantly higher in RT-PCR (+) group than RT-PCR (-) group ($p<0.05$); however, there was no significant difference in coronary artery disease (CAD), chronic obstructive pulmonary disease (COPD), chronic renal failure (CRF) and thyroid disease between RT-PCR (+) and RT-PCR (-) groups ($p>0.05$) (Figure 2).

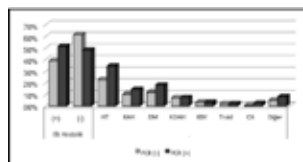


Figure 2: Analysis of comorbidities in RT-PCR(+) and RT-PCR(-) patients

There was CT finding compatible with viral pneumonia in 245 (71%) of RT-PCR (+) patients and 283 (57.2%) of RT-PCR (-) patients. The incidence of CT finding compatible viral pneumonia was significantly higher in RT-PCR (+) group compared to RT-PCR (-) group ($p<0.05$). At time of ED presentation, there was a mild in 72.2%, moderate in 21.7% and severe clinical manifestation in 6.1% of patients with positive RT-PCR test results. On the other hand, mild clinical manifestation was observed in 81.4%, moderate in 14.7% and severe in 3.9% patients with negative RT-PCR test results. The clinical manifestation at ED presentation was significantly more severe in RT-PCR (+) group compared to RT-PCR (-) group ($p<0.05$).

Regarding clinical outcome, 18.6% of RT-PCR (+) patients were discharged from ED, while 73.9% were admitted to COVID-19 clinic and 7.5% to COVID-19 intensive care unit. Mean length of hospital stay was 7.7±6.7 days in RT-PCR (+) group. Of RT-PCR (-) patients, 38.8% were discharged from ED while 57.0% were admitted to clinic and 4.2% to ICU. Mean length of hospital stay was 4.3±4.8 days in RT-PCR (-) group. The disposition rate was significantly lower in RT-PCR (+) group compared to

Table 1. Analysis of patients with positive or negative RT-PCR testing

		PCR (-)			PCR (+)			P	
		Mean± SD /n-%	Median	Mean± SD /n-%	Median				
Age		49.7 ± 18.4	48.0	55.5 ± 17.3	55.0	0.000	m		
Gender	Male	253	51.1%	208	60.3%	0.009	X ²		
	Female	242	48.9%	137	39.7%				
Travel History	-	487	98.4%	338	98.0%	0.662	X ²		
	+	8	1.6%	7	2.0%				
Occupation	Healthcare services	82	16.6%	26	7.5%	0.000	X ²		
	Non-healthcare services	413	83.4%	319	92.5%				
Medication	(+)	177	35.8%	171	49.6%	0.000	X ²		
	(-)	318	64.2%	174	50.4%				
	Anti-hypertensive	121	24.4%	117	33.9%	0.003	X ²		
	Anti-diabetic	57	11.5%	59	17.1%	0.021	X ²		
	Analgesics	5	1.0%	7	2.0%	0.221	X ²		
	Anticoagulant	56	11.3%	43	12.5%	0.611	X ²		
	Anti-arrhythmic	47	9.5%	33	9.6%	0.973	X ²		
	Bronchodilator	31	6.3%	23	6.7%	0.814	X ²		
	Other	55	11.1%	46	13.3%	0.330	X ²		
Comorbid disease	(+)	192	38.8%	178	51.6%	0.000	X ²		
	(-)	303	61.2%	167	48.4%				
	Hypertension	113	22.8%	119	34.5%	0.000	X ²		
	CAD	51	10.3%	50	14.5%	0.066	X ²		
	DM	59	11.9%	63	18.3%	0.010	X ²		
	COPD	36	7.3%	26	7.5%	0.886	X ²		
	CRH	17	3.4%	12	3.5%	0.973	X ²		
	Thyroid disease	11	2.2%	8	2.3%	0.926	X ²		
	CA	3	0.6%	9	2.6%	0.016	X ²		
	Other	26	5.3%	29	8.4%	0.069	X ²		
Pneumonia	(+)	283	57.2%	245	71.0%	0.000	X ²		
	(-)	212	42.8%	100	29.0%				
General health status at ED presentation	Mild	403	81.4%	249	72.2%	0.006	X ²		
	Moderate	73	14.7%	73	21.2%				
	Severe	17	3.4%	23	6.7%				
Length of hospital stay		4.3 ± 4.8	4.0	7.7 ± 6.7	7.0	0.000	m		
Clinical outcome	Discharge	474	95.8%	299	86.7%	0.000	X ²		
	Death	21	4.2%	46	13.3%				

(continued)

(continued)

		PCR (-)		PCR (+)		P	
		Mean± SD /n-%	Median	Mean± SD /n-%	Median		
ED outcome	Discharge	192	38.8%	64	18.6%	0.000	X ²
	Admission to clinic	282	57.0%	255	73.9%		
	Admission to ICU	21	4.2%	26	7.5%		

^aMann-Whitney u test/ X² Chi-square test

RT-PCR (-) group ($p < 0.05$). In addition, mean length of hospital stay was significantly longer in RT-PCR (+) group when compared to RT-PCR (-) group ($p < 0.05$). Twenty-one patients with negative RT-PCR results (4.2%) underwent noninvasive ventilation, continuous positive airway pressure or intubation. On the other hand, 26 patients with positive RT-PCR results (7.5%) underwent noninvasive ventilation, continuous positive airway pressure or intubation. In RT-PCR (+) group, 86.7% of patients admitted were discharged while 13.3% died. In RT-PCR (-) group, 95.8% of patients admitted were discharged while 4.2% died. The mortality rate was significantly higher in RT-PCR (+) group than RT-PCR (-) group ($p < 0.05$). Among these patients, 23 of them died due to MOF, 15 of them died ARDS, five of them died due to APE, and three of them died due to ACS.

Discussion

COVID-19 epidemiology can show variations across countries. It is proposed that the variation in epidemiology results from factors including genetic, demographic and sociocultural characteristics, diversity of healthcare services, control strategies for pandemic, differences in treatment and epidemiological data. In a study from Italy, Spina et al. showed effects of healthcare services on spread of the disease. In addition, Lu et al. showed that clinical severity might differ in cases with diverse genomic characteristics (10, 11). There are several reports indicating different outcomes regarding prevalence and severity of COVID-19 infection (12). In our study, we retrospectively reviewed included 840 patients who presented to

a tertiary emergency department in the biggest city of Turkey with fever and at least one symptom or finding of acute respiratory tract infection (cough, shortness of breath) and underwent RT-PCR testing as they fulfilled possible case definition; the RT-PCR positivity rate was 41% in the series. In a study on 51 patients, Fang et al. reported RT-PCR positivity rate as 71% (13). The reason for this low ratio might be attributed to that even though repeated sampling has been done on the patients with negative RT-PCR results, the initial RT-PCR positivity was taken into the account while conducting the study. In a study by Cai et al., it was found that positivity rate was higher among male patients. In another study from China, it was reported that 58% of cases were male. In another study, it was shown that there was no gender preponderance but clinical picture was more severe in male patients (14, 15). In our study, mean age was 55.5 ± 17.3 years and 60.3% were men in agreement with literature.

In our study, 18.6% of RT-PCR (+) patients were discharged by recommendation of isolation while 73.9% were admitted to COVID-19 clinic and 7.5% to COVID-19 ICU. Mean length of hospital stay was 7.7 ± 6.7 days. In a Chinese study by Zhou et al., chronic HT and / or DM was frequently observed in case series (16-20). In addition, in a meta-analysis (including 7 studies, Yang et al. demonstrated that most common comorbidities were HT and DM (11). In our study, we assessed comorbidity and medications in RT-PCR (+) patients. The most common comorbidity was HT by 34.5% while the most common drug class was anti-hypertensive agents by 33.9%.

In a report by Chinese Center for Disease Control and Prevention, clinical course was mild 81% and moderate in 14% of cases while 5% were critically ill.

In the study by Fang et al., CT showed positive findings in 98% of patients with positive RT-PCR testing (13-17). In our study, at time of ED presentation, there was mild clinical manifestation in 72.2% whereas moderate in 21.7% and severe in 6.1% of patients with positive RT-PCR testing. In addition, 71% of patients had CT findings compatible with COVID-19 disease. Liu et al. attributed variations in clinical course to viral load in addition to individual characteristics (16). The healthcare providers exposed highest viral load during pandemics. In our study, RT-PCR (+) positivity rate was 7.5% in healthcare providers but no mortality was observed.

In a study from, in-hospital mortality was reported as 15%. In another study from US, in-hospital mortality was reported as 21%. Liang et al. reported a mortality rate of 3.2% (18-22). The comorbidity incidence was 25.1% (15-17). In our study, there was a comorbid condition in 51.6% of RT-PCR (+) patients and mortality rate was 13.3% in this group. In our study, lower mortality rate was observed when compared to the studies with similar comorbidity rate in the literature, concluding that comorbidity is one of the major factors determining mortality. There was a comorbid condition in RT-PCR (-) patients and mortality rate was 4.2% in this group.

Conclusions

Although sample size was sufficient, RT-PCR positivity rate seemed lower than literature. Studies on larger samples can be helpful in this issue. In addition, mortality rate was lower compared to literature. It may be due to lower mean age of population and lifestyle habits such as smoking habits of the patients.

Author Contributions

Conception and design of the research: Altınbilek E, Öztürk D, Atasoy C; Acquisition of data: Altınbilek E, Özlem M; Analysis and interpretation of the data: Yılmaz F, Kavalcı C; Writing of the manuscript: Altınbilek E, Özlem M, Yılmaz F; Statistical analysis: Altınbilek E, Özlem M; Obtaining financing: Özlem M; Critical revision of the manuscript for important intellectual content: Yılmaz F, Kavalcı C, Altınbilek E.

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Informed Consent

All patients provided written informed consent prior to study participation.

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Conflict of Interest

“Each author declares that he or she has no commercial associations (e. g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article”.

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