

Evaluation of Patients With Covid-19 Diagnosis for Chronic Diseases

Murat Altuntas (✉ murataltuntas@yahoo.com)

Clinic of Family Medicine, University of Health Sciences Bagcilar Research and Training Hospital,
Istanbul, Turkey <https://orcid.org/0000-0003-0282-2721>

Habip Yilmaz

Istanbul Provincial Health Directorate: Istanbul Il Saglik Mudurlugu

Emre Güner

Istanbul Provincial Health Directorate: Istanbul Il Saglik Mudurlugu

Research

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Abstract

Aim: Covid-19 is one of the most important pandemics in the world history. Chronic diseases, which are risk factors that increase the case fatality rates, have been the leading cause of death all over the world. In this study, it was aimed to detect coexisting diseases in patients hospitalized with the diagnosis of Covid-19.

Material and Method: It was carried out with the data of 229 inpatients in an intensive care unit between 01.06.2020 - 30.06.2020. Among the inclusion criteria of the study; it is necessary to have a diagnosis confirmed by PCR test, to be hospitalized in the relevant intensive care unit on the date of the study and to have data accessible through the hospital automation system. According to literature; chronic diseases of the patients and their effects on the covid-19 process were evaluated. Statistical analyzes were performed using the Statistical Package for Social Sciences (SPSS) version 24.0 (IBM Corp .; Armonk, NY, USA).

Results: It was seen that the average age of the patients were 61.4 ± 15.9 years old. While the average symptom duration was 8.2 ± 5.3 days; total hospitalization period was 13.1 ± 5.9 days. The length of stay of 75 patients who were sent to intensive care unit was determined as 10.1 ± 7.1 . The most common chronic disease among patients was hypertension with 47.2%. This was followed by diabetes mellitus (32.8%) and heart disease (27.5%), respectively. In the presented study, cough (59.4%), fever (58.5%) and shortness of breath (45.9%) were found to be the most common symptoms. Leukopenia, impairments in liver and muscle enzymes, abnormal C-reactive protein, ferritin and d-dimer levels were the important laboratory findings.

Conclusion: Particular attention should be paid to the elderly Covid-19 patients with chronic diseases, especially DM, HT and cancer.

Introduction

In December 2019, a new severe acute respiratory syndrome coronavirus-2 (Sars-CoV-2) was reported in Wuhan, China. The disease caused by this virus has also named as Covid-19 (1). Covid-19 is the largest pandemic in the world after H1N1 influenza epidemic in 1918 (2). The clinical course of the disease may vary from mild upper respiratory tract infection findings to severe viral pneumonia accompanied by loss of taste and smell and respiratory failure (3).

Although the virus infects individuals of all ages; it is known that people at an older age and with concomitant chronic diseases have more severe disease. The increasing number of cases every day mostly threatens people with previously known chronic diseases (4). Risk factors associated with serious disease and mortality are advanced age, cardiovascular disease (CVD), diabetes mellitus (DM), hypertension (HT), chronic lung disease, cancers, chronic kidney disease (CKD), use of immunosuppressive or biological agents, obesity, and smoking (5). These diseases, which are risk factors

that increase the case fatality rates, have been the leading cause of death in all developed or developing countries all over the world (6).

Chronic diseases affect mortality with different mechanisms during Covid-19. It is known that there is an increase in troponin level associated with disease severity and mortality during the course of the disease. Severe viral infections causing systemic inflammatory syndrome increase the risk of plaque, rupture and thrombus formation, and thus cardiovascular events (7). In the course of Covid-19, microangiopathic changes occurring in the respiratory tract of diabetic patients reduce gas exchange and lung compliance and cause a significant decrease in FVC and FEV1 (8). Hypertension has a special place among chronic diseases. Sars-CoV-2 enters target cells by binding to angiotensin converting enzyme 2 (ACE2) expressed on epithelial cells of lung, kidney, blood vessels. ACE2 expression increases in patients with HT and DM, who are treated with ACE inhibitors or receptor blockers (9).

It is known that the rates of chronic diseases are also high in regions with high mortality rates such as China, Europe, and the United States (10). Identifying additional disease risks associated with Covid-19 patients will also affect the survival of individuals in this group. With this study, it was aimed to detect coexisting diseases in patients hospitalized with the diagnosis of Covid-19.

Material And Method

The study was carried out in Health Sciences University Bağcılar Training and Research Hospital Adult Intensive Care Unit between 01.06.2020–30.06.2020. It is a prospective, cross-sectional study. Among the inclusion criteria of the study; it is necessary to have a diagnosis confirmed by Polymerase Chain Reaction (PCR) test, to be hospitalized in the relevant intensive care unit on the date of the study and to have data accessible through the hospital automation system. A total of 229 patients who have these criterias were included in the study.

Statistical analyzes were performed by IBM SPSS Statistics 24 program. Descriptive data are presented by giving percentage distributions and mean \pm standard deviation. T-test was used for measurement data in independent groups and Pearson chi-square test was used for census data in examining causality relationships. Considering the 95% confidence interval and 5% margin of error in the analyzes, $p < 0.05$ was accepted as a significance level.

Results

32.8% of the study group were female (75 patients), 67.2% were male (154 patients). It was seen that the average age of the patients were 61.4 ± 15.9 years old. While the average symptom duration was 8.2 ± 5.3 days; total hospitalization period was 13.1 ± 5.9 days. The length of stay of 75 patients who were sent to intensive care unit was determined as 10.1 ± 7.1 .

The most common chronic disease among patients was hypertension with 47.2%. This was followed by diabetes mellitus (32.8%) and heart disease (27.5%), respectively. The distribution of patients according

to their chronic diseases were given in table.1.

In the study, distribution of the Covid-19 inpatients according to their symptoms and the treatments they received; were given in table.2. According to the symptom distribution of the patients; it was observed that cough, fever and shortness of breath were observed with close frequency. Among the symptoms of fever, cough, shortness of breath and runny nose, the least common symptom was runny nose with 2.2%. Considering the distribution of the disease according to its clinical severity; it was seen that the most common clinical presentation was "moderate" (50.7%). While applying favipiravir treatment in all patients, it was seen that the least applied treatment is corticosteroid treatment with 14.8%. When the treatment results of the patients were examined, it is observed that 59.5% were still hospitalized during the period when the study data were collected, and 24% died. The distribution of hospitalization biochemical values is presented in table.3.

After the valuation of post descriptive data, causality comparisons were performed. Causality comparisons were planned according to gender and chronic diseases.

Causality comparisons by gender:

When the distribution of chronic diseases by gender was examined; DM, HT and asthma were significantly higher in females than males (respectively; $\chi^2 = 6.407$, $p:0.016$; $\chi^2 = 7.370$, $p:0.007$; Fisher's $p:0.011$). Chronic obstructive pulmonary disease (COPD) is significantly higher in men than women ($\chi^2 = 4.647$, $p:0.031$).

When the distribution by gender is examined in terms of the severity of the clinical picture and prognosis; there was no significant difference between the two sexes ($\chi^2 = 2.396$, $p:0.494$; $\chi^2 = 3.242$, $p:0.198$, respectively). When the results of the patient treatment were examined according to gender, no significant difference was found ($\chi^2 = 4.034$, $p:0.401$). Again, when disease symptoms were examined by gender, no significant difference was found in terms of fever, cough, shortness of breath and nasal discharge (respectively; $\chi^2 = 1.950$, $p:0.163$; $\chi^2 = 0.195$, $p:0.659$; $\chi^2 = 0.154$, $p:0.695$; Fisher's $p:0.695$, respectively).

Looking at the age distribution by gender; it is seen that women are significantly older than men (t test: $p:0.007$). Hospitalization C-reactive protein (CRP) value was found to be significantly higher in men than women (t test: $p:0.001$).

Causality comparisons according to chronic diseases:

When the symptoms of fever, cough, shortness of breath and runny nose are examined according to chronic diseases; there was no difference in the presence of DM, COPD, neoplasia. Those with HT are significantly higher than those without fever ($\chi^2 = 4.850$, $p:0.028$). Patients with asthma were significantly more likely to be shortness of breath than the others ($\chi^2 = 8.341$, $p:0.004$). The patients with heart disease were significantly higher in cough and shortness of breath than those without ($\chi^2 = 4.992$, $p:0.025$; $\chi^2 = 4.463$, $p:0.035$, respectively).

Considering the clinical picture of those with DM, the rate of bad and severe ones were significantly higher than those without ($\chi^2 = 10.466$, $p:0.015$). Similarly, the rates of admission to intensive care unit and exitus were higher in this patient group ($\chi^2 = 7.584$, $p:0.006$; $\chi^2 = 10.367$, $p:0.035$).

There is no significant difference in clinical picture and outcome of those with HT. The rates of admission to intensive care are higher in this patient group than those who are not ($\chi^2 = 6.069$, $p:0.014$).

No significant difference were found between those with and without COPD and asthma in terms of clinical picture, prognosis, admission to intensive care and outcome compared to those without COPD.

When compared with those without heart disease, those with heart disease admitted to intensive care were higher (for ICU admission $\chi^2 = 6\text{ç}429$, $p:0.011$).

When patients with neoplasia and those without neoplasia are compared; it is seen that the clinical picture is significantly worse in patients with neoplasia than those without neoplasia ($\chi^2 = 16.721$, $p:0.001$). When examined in terms of results, it was found that the rate of exitus in patients with neoplasia was significantly higher than in those without ($\chi^2 = 16.147$, $p:0.003$).

Cross comparisons of chronic diseases and laboratory values:

While blood urea nitrogen (BUN) and CRP are significantly higher in DM patients than those without DM, the duration of symptoms is shorter (t test: $p:0.0001$, $p:0.001$, $p:0.042$, $p:0.005$, respectively).

While BUN, procalcitonin and d-dimer are significantly higher in patients with HT than those without HT, the symptom duration is shorter (t test: $p:0.0001$, $p: 0.001$, $p:0.0001$, $p:0.007$, $p:0.008$, respectively).

Age, CRP, and total length of stay were significantly higher in patients with COPD than those without (t test: $p:0.001$, $p:0.009$, $p:0.007$, respectively). Symptoms and duration of intensive care were found to be lower in patients with asthma compared to those without intensive care (t test: $p:0.011$, $p:0.036$, respectively). There was no significant difference for the others.

Age, BUN, creatinine and non-d-dimer were significantly higher in those with heart disease than those without. The symptom duration was lower (t test: $p:0.0001$, $p:0.0001$, $p:0.035$, $p:0.004$, $p:0.015$, respectively).

Discussion

In the studies conducted in different countries during the first period of the global epidemia, it was found that most of the patients were male and advanced age (11, 12, 13). In one of the first studies on this field conducted in Wuhan, it was reported that the patients were mostly composed of elderly women and the most important diseases associated were hypertension, diabetes, heart diseases and COPD (14). Similar results to other studies (male ratio 67.2%, mean age 61.4 ± 15.9) were obtained in the study.

Hypertension was found to be the most common chronic disease associated with patients diagnosed with Covid-19 in the study (47.2%). High risk of serious disease in hypertensive patients was thought to be related; with the use of angiotensin converting enzyme 2 (ACE2) as the viral entry receptor in lung cells by the virüs, with the high prevalence of hypertension in the population, and the frequency of use of renin-angiotensin system (RAS) blockers (14). In the study, although fever in these patients is statistically significantly higher than other symptoms, the mechanism of this is not fully known. In different studies, it is emphasized that hypertension is a common comorbidity for COVID-19 infection, which significantly affects mortality and disease severity (11, 12, 15, 16).

The frequency of diabetes mellitus in the study was found to be 32.8%. With this rate, diabetes is the second most common disorder among the patients who participated in the study. For diabetes mellitus, Huang et al. has reported as the main comorbidity disease with a frequency of 20% (11). Its' frequency was found around 10% in different studies (17).

Cardiovascular diseases are the third most common chronic disease group in the study (27.5%). Case series with additional cardiovascular disease have also been reported in the literature (18, 19).

Although the disease affects the respiratory tract; Huang et al (11) and Wang et al (18) found the prevalence of accompanying COPD to be 2% and 2.9%, respectively. Similarly, Chen et al. (19) found associated respiratory system diseases 1% in their study. In the study, COPD was seen at a very high rate with 8.3% and asthma 5.7%. These high rates found in the study have been associated with the high frequency of respiratory system diseases. In addition, although rare, bronchiectasis, interstitial lung disease and tobacco use have been reported as coexisting risk factors alone (12, 13, 20, 21). Moreover; in patients with asthma, the statistically significant excess of shortness of breath was associated with the clinical course of the disease.

Advanced DM, HT, neoplasia and heart disease patients with Covid-19 required significantly more intensive care. There was no relationship between the need for intensive care and the severity of the disease with COPD. This is an interesting finding that needs to be studied.

Neurological diseases are the disease group that cause the highest health burden especially in the elderly population (22). Despite this, no neurological disease was found in the records of patients diagnosed with Covid-19 in the study. Considering that neurological diseases require long-term follow-up and treatment; even if there is no Covid-19 diagnosis, special attention should be paid to the follow-up of these patients.

In the presented study, no findings regarding with digestive system disorders and Covid-19 were found. But; it has been reported that some patients with Covid-19 show digestive symptoms such as diarrhea, vomiting and abdominal pain, and the average liver enzyme levels of these patients are also high (23). Although it has been stated that inflammatory bowel diseases such as Crohn's and colitis ulcerosa may be additional diseases in Covid-19 in terms of genetic predisposition and environmental factors (24), no

findings in this direction were found in the study. This is attributed to the certain study group in the intensive care unit.

In the presented study, cough (59.4%), fever (58.5%) and shortness of breath (45.9%) were found to be the most common symptoms. This situation was parallel to the literature (3, 19, 21).

In the conducted studies, leukopenia is the most common laboratory finding; rarely, thrombocytopenia is observed (3, 12, 25). In the literature, impairments have also been reported in liver and muscle enzymes. Abnormal elevations can also be observed in C-reactive protein, ferritin and d-dimer levels (16, 17). The study findings were also in line with data from the world.

Conclusion

It would be appropriate to evaluate carefully to Covid-19 patients, especially for the current chronic diseases. Particular attention should be paid to the elderly Covid-19 patients with chronic diseases, especially DM, HT and cancer.

Abbreviations

ACE-2 (Angiotensin Converting Enzyme-2)

BUN (Blood urea nitrogen)

CKD (Chronic kidney disease)

COPD (Chronic obstructive pulmonary disease)

CRP (C-Reactive protein)

Covid-19 (Severe Acute Respiratory Syndrome 2, SARS-2)

CVD (Cardiovascular disease)

DM (Diabetes mellitus)

FEV-1 (Forced expiratory volume in 1 second)

FVC (Forced vital capacity)

HT (Hypertension)

ICU (Intensive care unit)

PCR (Polymerase Chain Reaction)

RAS (Renin angioensin system)

SPSS (Statistical Package for Social Sciences)

Declarations

***Ethics approval and consent to participate**

It was approved by the Ethics Committee of Istanbul Göztepe Training and Research Hospital with the decision number 2020/0243. In addition; TR Ministry of Health Scientific Research Platform on Covid-19 has also obtained a work permit with the date 04.05.2020 and number T190535.

***Consent to publication**

Not applicable

***Availability of data and material**

Not applicable

***Competing interests:**

There is no financial or non-financial conflict of interest

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***Authors' contributions**

Murat Altuntas: Drafting the work, substantial contributions to the conception of the work, acquisition, analyses, final approval of the version to be published

Habip Yilmaz: Collected the data, final approval of the version to be published

Emre Guner: Final approval of the version to be published

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Tables

Table 1.

Disease	Number*	Percentage
Diabetes mellitus	75	32.8
Hypertension	108	47.2
Chronic obstructiv pulmonary disease (COPD)	19	8.3
Asthma	13	5.7
Cardiovascular disease	63	27.5
Neoplasia	16	7.0

*: Those with more than one registered disease at the same time in the automation system were included in all groups separately.

Table 2.

	N*	%
Fever	134	58.5
Cough	136	59.4
Shortness of breath	105	45.9
Runny nose	5	2.2
Clinic		
Mild	1	0.4
Moderate	116	50.7
Bad	21	9.2
Terrible	91	39.7
Intensive care admission	93	40.6
Oseltamivir treatment	154	67.2
Favipiravir treatment	229	100.0
Combined therapy	101	44.1
Vitamin C	117	51.1
Cortikosteroid	34	14.8
Anticoagulant therapy	192	83.8
Mechanical ventilation	67	29.3
Result (n=227)		
Exitus	55	24.0
Hospitalization continues	135	59.5
Admission to intensive care	32	14.0
Hospitalization in another service	1	0.4

**: Those with more than one registered disease at the same time in the automation system were included in all groups separately.*

Table 3.

	N	Minimum	Maximum	Average	Std. deviation
Leukocyte	228	830.0	59770.0	8036.7	5571.9
BUN	227	13.0	244.1	44.6	32.6
Creatinin	210	.3	10.3	1.3	1.2
Aspartat aminotransferaz (AST)	229	9.0	2028.0	47.5	134.9
Alanın aminotransferaz (ALT)	229	6.0	561.0	38.6	45.2
C-reaktif protein (CRP)	219	.01	318.4	87.1	73.4
Procalcitonin	107	.01	20.0	1.4	3.5
Ferritin	154	13.0	36872.5	925.6	3107.0
D-dimer	209	0.01	27.7	1.2	2.5