

## Original Article

# Coronavirus Disease 2019 in Patients with Asthma: Case Study from a Tertiary Center Regarding Their Phenotypes and Their Adherence to Asthma Treatment by Telemedicine

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## Abstract

**OBJECTIVE:** The aim of this study was to determine the prevalence and the characteristics of coronavirus disease 2019 in a tertiary outpatient clinic of asthma patients, to find the predisposing asthma phenotype to coronavirus disease 2019, and to see their adherence to asthma treatment.

**MATERIAL AND METHODS:** A retrospective, cross-sectional, real-life study was conducted via phone interviews with the patients being followed in the asthma outpatient clinic. From the files of the patient, information was obtained about their demographics, asthma phenotype, co-morbidity, prick tests, spirometry test results, and their medications at the last visit before the coronavirus disease 2019 pandemic. Information about asthma exacerbations, asthma control test, asthma treatment adherence, and history of coronavirus disease 2019 were obtained via telephone interviews.

**RESULTS:** Of the 573 patients with asthma, 13 (2.26%) had coronavirus disease 2019 history. The mean age of patients with asthma and coronavirus disease 2019 was  $51.84 \pm 14.92$  years. Two patients were on mepolizumab and 1 was on omalizumab treatment. Mean asthma control test was  $19.84 \pm 2.73$ . Lack of adherence was reported in 8% of all patients with asthma compared to 23% in the patients who had coronavirus disease 2019. Asthma exacerbation was seen during the course of severe acute respiratory syndrome coronavirus 2 infection in 3 of 13 patients with asthma. Asthma exacerbations were reported during the period of 1 month following coronavirus disease 2019 in 2 patients.

**CONCLUSION:** The most common asthma phenotype in the cases of coronavirus disease 2019 was obese phenotype. Rates of using biological agents and non-adherence to the treatment were found to be higher. Asthma exacerbation may be seen during course of coronavirus disease 2019 albeit being less common.

**KEYWORDS:** Asthma, COVID-19, pandemic

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## INTRODUCTION

In the initial phase of the coronavirus disease 2019 (COVID-19) pandemic, it has been predicted that the presence of an underlying chronic respiratory tract disease may cause serious co-morbidity because the disease involves the respiratory tract particularly. In the forthcoming period, it has been found that the cardiovascular and metabolic diseases might cause more severe co-morbidity compared to the respiratory tract diseases.<sup>1</sup>

As in other chronic pulmonary diseases, during the initial phase of the pandemic, asthma was considered to be an important risk factor for COVID-19 because of its chronic nature as well as its risk of exacerbation. It was also predicted that the inhaler and systemic steroid used in treatment of asthma might trigger this risk by predisposing to infections. But surprisingly, the first analyses on COVID-19 revealed that the patients with asthma showed a similar presentation to the general population, and studies were published supporting that asthma was not a risk factor for being contaminated with COVID-19 and for mortality.<sup>2,3</sup> In several studies, the frequency of asthma in the patients with COVID-19 has been reported as ranging between 3% and 12.5%.<sup>4-6</sup> It has been reported that some co-morbidities in the patients with asthma, their non-adherence to the treatment, or continuous use of oral steroids might increase the risk.<sup>7</sup>

When the study is completed (December 11, 2020), our country has reported 1 780 673 confirmed cases of the disease and 15 977 people have died as a result of infection. The general prevalence of COVID-19 was 2.22%. Although the population of İstanbul is about 1/5 of the general population, approximately 1/3 of the cases in Turkey were seen in İstanbul, and all of our patients were living in İstanbul.

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The aim of this study was to determine the prevalence and the characterization of COVID-19 in a tertiary outpatient clinic of asthma patients by telemedicine, to find the predisposing phenotype to COVID-19, and to see their adherence to asthma treatment and their level of control during 9 months' period.

**MATERIAL AND METHODS**

**Study Design**

This retrospective, cross-sectional, real-life study is approved by the institutional ethics committee on October 16, 2020, with file number 23786442-604.01-01-136636.

**Setting**

The patients followed by the asthma outpatient clinic between 2018 and 2020 with available medical information were interviewed by 4 doctors via telephone from November 28, 2020, to December 11, 2020.

**Participants**

The inclusion criteria were as follows: the patients above 18 years old and having a diagnosis of asthma based on Global INitiative for Asthma (GINA) 2020 criteria,<sup>8</sup> being regularly followed over the last 2 years in our asthma outpatient clinic, and having given oral informed consent. The exclusion criteria were being irregularly followed in the outpatient clinic (those not coming to control visits over the last year), communication information not being current, and not having given oral informed consent.

**Variables**

From the files of the patients, information was obtained about their age, sex, smoking habits, asthma phenotype, co-morbidity, prick tests, spirometry test results at the last visit before the COVID-19 pandemic, and medications for asthma. On the telephone interviews, the patients were asked whether they had asthma exacerbation requiring systemic steroid use for at least 3 days during the pandemic period. The asthma control tests (ACT) were performed.<sup>9</sup> Adherence to the asthma treatment during the pandemic was investigated by asking "How often did you adhere to your asthma treatment during the pandemic?" and the patients were asked to choose one of the possible answers: very often (every day regularly), often (every day but rarely forgotten), sometimes (more than 3-4 days a week), rarely (3-4 times a month), and never (not taken). Information was obtained on whether they

had COVID-19, if they had its severity, course, the medications used, and exacerbation of asthma during and following course of COVID-19.

**Bias**

Information on whether the patients had COVID-19 could not be reached for the patients who could not be reached by phone or those not giving consent.

**Statistical Analysis**

All information on the patients who had COVID-19 was given on an individual basis. Numeric data of the patients not having COVID-19 was given as mean ± standard deviation if they showed normal distribution, and their quantitative data were represented as percentages.

**RESULTS**

**Patients**

Of 894 patients, 612 were reached by phone; 39 patients were excluded because they refused giving consent. A total of 573 patients were included. History of COVID-19 was found in 13 (2.26%) out of 573 asthma patients included in the study. Coronavirus disease 2019 was confirmed with polymerase chain reaction (PCR) testing, 2 of them also had computed tomography findings related to COVID-19.

**Descriptive Data**

Mean age of all asthma patients included in the study was 42.58 ± 14.88 years with 70.5% of them being female. In total, 283 (49.3%) patients were allergic, 89 (15.3%) non-allergic, 187 (32.6%) eosinophilic, and 156 (27.2%) were obese. A total of 257 (44.9%) patients had allergic rhinitis, 200 (34.9%) had non-allergic rhinitis, 164 (28.6%) had sinusitis, 170 (29.6%) had gastroesophageal reflux, 19 (3.3%) had diabetes mellitus, and 68 (11.8%) had hypertension.

In the COVID-19 group, the mean age of patients was 51.84 ± 14.92 years, and 11 (84.6%) patients were female. Four (30.7%) patients were allergic, 3 (23%) were non-allergic, 4 (30.7%) were eosinophilic, and 5 (38.4%) patients were obese. Five patients had allergic rhinitis, 3 gastroesophageal reflux, 2 sinusitis, 1 perennial rhinitis, and 1 had diabetes mellitus and hypertension, and 3 patients did not have co-morbidity accompanying asthma.

**Outcome Data**

Mean ACT was 18.87 ± 5.03 for all patients. Of the patients, 55.5% were controlled (ACT > 19), while 45.5% of them were uncontrolled (ACT < 20). To the question "How often did you adhere to your asthma treatment during the pandemic" asked to determine adherence to the treatment, 276 (48.1%) patients gave the answer "very often," 106 (18.4%) "often," 94 (16.4%) "sometimes," 51 (8.9%) "rarely," and 46 (8%) patients gave the answer "never." Information on asthma therapy steps and number of flare-ups with systemic steroid during the pandemic are given in Table 1.

In the COVID-19 group, treatments varied depending on the asthma stage. Two patients were on mepolizumab treatment, and another one was on omalizumab treatment. Mean ACT was 19.84 ± 2.73. To the question "How often did you adhere to your asthma treatment during the pandemic," 9 (69.2%)

**MAIN POINTS**

- The prevalence of coronavirus disease 2019 (COVID-19) in asthma patients is similar to the population.
- Mortality rate due to COVID-19 in asthma patients is lower than the society.
- The most common phenotype among asthmatic patients with COVID-19 is obese asthma.
- Non-compliance with asthma treatment may be a condition that increases the risk of COVID-19.
- Having severe asthma or biologic agent therapies may be a factor that increases the risk of COVID-19.

**Table 1.** Clinical Characteristics of Patients with Asthma

	All Asthma Patients	COVID-19 Group	Non-COVID-19 Patients
Number	573	13	560
Mean age (years)	42.58 ± 14.88	51.84 ± 14.92	42.36 ± 14.83
Sex (n)			
Male	169 (29.4%)	2 (15.4%)	167 (29.8%)
Female	404 (70.5%)	11 (84.6%)	393 (70.2%)
Smoking habits (n)			
Non-smoker	363 (63.3%)	10 (76.9%)	353 (63%)
Smoker	37 (6.4%)	0 (0%)	37 (6.6%)
Ex-smoker	173 (30.1%)	3 (23.1%)	170 (30.4%)
Asthma phenotype			
Allergic	283 (49.3%)	4 (30.7%)	279 (49.8%)
Non-allergic	89 (15.3%)	3 (23%)	86 (15.4%)
Eosinophilic	187 (32.6%)	4 (30.7%)	183 (32.7%)
Obese	156 (27.2%)	5 (38.4%)	151 (27%)
Asthma comorbidities			
Allergic rhinitis	194 (33.8%)	5 (38.5%)	189 (33.8%)
Perennial rhinitis	12 (2.09%)	1 (7.7%)	11 (2%)
Sinusitis	73 (12.7%)	2 (15.4%)	71 (12.7%)
Gastroesophageal reflux	170 (29.6%)	3 (23.1%)	167 (29.8%)
Diabetes mellitus	19 (3.31%)	1 (7.7%)	18 (3.2%)
Hypertension	68 (11.8%)	1 (7.7%)	67 (12%)
None	178 (31.1%)	3 (23.1%)	175 (31.3%)
BMI (kg/m <sup>2</sup> ) (n)			
>30	156 (27.2%)	4 (30.7%)	152 (27.1%)
<30	417 (72.8%)	9 (69.3%)	408 (72.9%)
Asthma therapy (n)			
Step 1	26 (4.3%)	2 (15.4%)	24 (4.3%)
Step 2	35 (6.1%)	0 (0%)	35 (6.3%)
Step 3	103 (17.9%)	3 (23%)	100 (17.9%)
Step 4	286 (49.9%)	3 (23%)	283 (50.5%)
Step 5	123 (21.4%)	5 (38.6%)	118 (21%)
Asthma therapy adherence during the pandemic (n)			
Very often (using therapy always regularly)	276 (48.1%)	9 (69.2%)	267 (47.7%)
Often (using therapy often)	106 (18.4%)	0 (0%)	106 (18.9%)
Sometimes (using therapy sometimes)	94 (16.4%)	1 (7.7%)	93 (16.6%)
Rarely (using therapy rarely)	51 (8.9%)	0 (0%)	51 (9.1%)
Never (using therapy never)	46 (8%)	3 (23%)	43 (7.7%)
Number of flare-up with systemic steroid during the pandemic (n)*			
Yes	39 (6.8%)	7 (53.8%)	32 (5.7%)
No	534 (93.2%)	6 (46.2%)	528 (94.3%)
ACT			
Mean ± SD	18.87 ± 5.03	19.84 ± 2.73	18.84 ± 5.85
20-25 N (%)	312 (55.5%)	6 (46.2%)	306 (54.6%)
19-5 N (%)	261 (45.5%)	7 (53.8%)	254 (45.4%)

ACT, asthma control test; BMI, body mass index; COVID-19, coronavirus disease 2019; SD, standard deviation.

\*It is the total number of flare-ups in the first 9 months of the pandemic. In COVID-19 group, different from the one in Table 2, it also includes the flare-ups they had in the pre-COVID period.

patients gave the answer “very often,” 3 (23%) “never,” and 1 (7.7%) “sometimes.”

In the non-COVID-19 group, mean ACT was  $18.84 \pm 5.85$ . There was no flare-up in 528 (94.3%) patients. To the question “How often did you adhere to your asthma treatment during the pandemic,” 267 (47.7%) patients gave the answer “very often,” 106 (18.9%) patients gave the answer “often,” 93 (16.6%) “sometimes,” 51 (9.1%) patients gave the answer “rarely,” and 43 (7.7%) “never.” Non-COVID-19 patients’ other clinical characteristics are given in Table 1.

Upon presentation to the emergency department for COVID-19, all patients had different symptoms, but weakness, myalgia, and fever were the most common symptoms. The patients presented to the hospital by distinguishing these symptoms from asthma flare-ups and reported that they were not similar with the asthma flare-ups. During the COVID-19, of the 2 patients hospitalized, one had an asthma flare-up at that time, and the other 2 patients, who were not hospitalized, had exacerbation during COVID-19. No patients developed adult respiratory distress syndrome (ARDS) and did not require intensive care or in-home oxygen therapy upon discharge. Asthma exacerbation developed during the course of severe acute respiratory syndrome coronavirus 2 (SARS-CoV2) infection in 3 of 13 patients with asthma. In 2 patients, asthma flare-up developed during the first month following COVID-19 although they continued the treatment regularly. In one of them, systemic steroid was added to the treatment and in the other one, dose of inhaled corticosteroids was increased. The data of asthma patients who had COVID-19 are presented in Table 2.

## DISCUSSION

During the period of 9 months, COVID-19 was found in 2.26% of the subjects. The most common phenotype in the cases of asthma and COVID-19 was obesity and only 1 case had co-morbidities of diabetes and hypertension. A total of 69.2% of the patients experiencing COVID-19 adhered very often to their asthma treatment. Five of 13 patients were receiving asthma treatment of fifth-line with 3 of them using biological agents (2 mepolizumab and 1 omalizumab). Two patients were admitted to the hospital and one of them received supportive therapy and tocilizumab treatment. Three patients had asthma exacerbation concomitantly during the COVID-19 treatment. Two patients had asthma exacerbation in the first month following recovery from COVID-19.

The number of flare-up with systemic steroid during the pandemic was found to be higher in the group with COVID-19. The rate of answering “never” to the question “How often did you adhere to your asthma treatment during the pandemic” was 23% in the COVID-19 group, while it was 7.7% in the non-COVID-19 group.

The proportion of asthma patients with COVID-19 during the study period was 2.26%, whereas it was 2.22% during the same period in the general population of COVID-19. Prevalence rate of COVID-19 was found as 1.41% in a multi-center study assessing 71 182 patients with asthma during the pandemic period of the first 4 months.<sup>10</sup>

Advanced age, obesity, diabetes mellitus, hypertension, and decrease in adherence to the treatment increase risk and severity of COVID-19 in asthma.<sup>11</sup> In our study, it was observed that the most common phenotype in the patients having COVID-19 was obese asthma. Only one of our patients having COVID-19 was found to have diabetes mellitus and hypertension. One study determined risk factors for hospitalization as advanced age, Black race, male gender, and the presence of COPD and allergic rhinitis,<sup>12</sup> whereas our study included 2 female patients admitted to hospital at ages of 50 and 57 years.

At the beginning of the pandemic, it was predicted that inhaler and systemic steroids used in treatment of the patients with asthma might trigger the risk by predisposing to the infection, but subsequently, several studies were published showing that using ICS provided protection against COVID-19.<sup>13,14</sup> It was also shown that inhaler budesonide given in 7 days following initiation of symptoms shortened the recovery period in the patients with COVID-19.<sup>15</sup> In our study, 71.3% of the patients were using intermediate to high dose of ICS and the prevalence of COVID-19 in these patients was found to be similar to that in the general population. The fact that prevalence rate similar to the general population was found in our subjects although they were a population with chronic disease supports protective effect of using ICS, but this topic is not clear.

In the studies on the patients with severe asthma, incidence of COVID-19 was found to be lower.<sup>16</sup> In 1 study on 80 patients using high dose of ICS, COVID-19 was found in 3 of the patients and no admission to the intensive care unit (ICU) was required in any of them.<sup>17</sup> In our study, 5 of our asthma patients having COVID-19 were using asthma treatment step 5 and none of them required admission to the ICU. Only one patient required monitoring with oxygen support. Although it has not been clearly shown, using systemic corticosteroids may be responsible for severe COVID-19 course,<sup>18</sup> 6 of our 573 asthma patients were using systemic steroids. There was no patient using oral steroids among those having COVID-19.

There are studies on whether the biological agents used in asthma affect SARS-CoV2 infection and whether they modulate the viral agents is not certain. In 1 study on omalizumab, it was shown that use of omalizumab decreased the viral disease.<sup>19</sup> Twenty of the patients included in our study were receiving omalizumab treatment with only one of them having experienced COVID-19 (5%). Coronavirus disease 2019 was found in 2 (7.14%) of 14 patients using mepolizumab.

The rate of the answer of “Never” to the question “How often did you adhere to your asthma treatment during the pandemic period?” was 8% for all population and 23% in the COVID-19 group, supporting that non-adherence to the treatment increased risk of COVID-19.

COVID-19, however, did not show a severe course in the patient not adhering to asthma treatment; no asthma exacerbation was experienced during or following COVID-19 infection (Table 1).

**Table 2.** Clinical Characteristics of Patients with Asthma with SARS-CoV-2 Infection

Patients	Age	Sex	Smoking Habits	Asthma Phenotype	Asthma Comorbidities	BMI (kg/m <sup>2</sup> )	Prick Test	Spirometry Before Pandemic	Asthma and Rhinitis Therapy	ACT	Asthma Therapy Adherence During the Pandemic	Number of Flare-Up with Systemic Steroid During the Pandemic	Symptoms for COVID-19	Sars-Cov2 PCR and Thorax CT Positivity*	Hospitalization	COVID-19 Treatment	Asthma Flare-Up During COVID-19	Number of Asthma Flare-Up After COVID-19 Heals
1	35	F	No	Nons-allergic	No	18.5	Negative	FEV <sub>1</sub> : 3540 ml 100% FVC: 4830 ml 119% FEV <sub>1</sub> /FVC: 73%	As-needed low dose (ICS)/formoterol	24	Very often	0	Myalgia	+	No	Favipiravir 5 days (3 x 1600 mg loading, 3 x 600 mg maintenance) Enoxaparin sodium 5 days (40 mg 1 x 1)	No	0
2	50	F	Ex-smoker 9 package-year	Eosinophilic	Rhinitis Sinusitis	29.74	Negative	FEV <sub>1</sub> : 1360 ml 46% FVC: 2470 ml 73% FEV <sub>1</sub> /FVC: 55%	High dose ICS/salmeterol Theophylline Tiotropium Montelukast	17	Very often	2	Headache, eye pain, chill, fever, myalgia	++	Yes	Tocilizumab 2 dose (400 mg 1 x 1) Favipiravir 10 days (3 x 1600 mg loading, 3 x 600 mg maintenance) Enoxaparin sodium 45 days (40 mg 1 x 1)	Yes	2
3	54	F	No	Allergic asthma	Allergic rhinitis	28.22	<i>D. Pteromyssinus</i> <i>D. Farinae</i>	FEV <sub>1</sub> : 1100 ml 49% FVC: 1840 ml 69% FEV <sub>1</sub> /FVC: 60%	Omalizumab High dose ICS/salmeterol Montelukast Desloratadine Mometasone nasal	16	Very often	0	Myalgia, weakness, fever	+	No	Favipiravir 5 days (3 x 1600 mg loading, 3 x 600 mg maintenance) Enoxaparin sodium 10 days (40 mg 1 x 1)	No	0
4	26	F	No	Eosinophilic Allergic	No	21.06	<i>D. Pteromyssinus</i>	FEV <sub>1</sub> : 1800 ml 58% FVC: 2910 ml 82% FEV <sub>1</sub> /FVC: 62%	Mepolizumab High dose ICS + salmeterol Montelukast	17	Very often	1	Chest pain, dyspnea, cough	+	No	Plaquenil 5 days (200 mg 2 x 1)	No	0
5	43	F	No	Obese asthma	No	34.3	Negative	FEV <sub>1</sub> : 1350 ml 98% FVC: 2230 ml 98% FEV <sub>1</sub> /FVC: 60%	Low dose ICS + salmeterol	18	Never	0	Anosmia, weakness, fever	+	No	Favipiravir 5 days (3 x 1600 mg loading, 3 x 600 mg maintenance) Enoxaparin sodium 10 days (40 mg 1 x 1)	No	0
6	45	F	No	Nons-allergic asthma	No	20.8	Negative	FEV <sub>1</sub> : 2210 ml 75% FVC: 3210 ml 95% FEV <sub>1</sub> /FVC: 69%	Low dose ICS + formoterol	23	Never	0	Weakness, myalgia, anosmia	+	No	Favipiravir 5 days (3 x 1600 mg loading, 3 x 600 mg maintenance) Enoxaparin sodium 10 days (40 mg/day) or (40 mg 1 x 1)	No	0
7	77	F	No	Obese asthma	Rhinitis	34.9	Negative	FEV <sub>1</sub> : 1390 ml 67% FVC: 2080 ml 83% FEV <sub>1</sub> /FVC: 67%	Low dose ICS + vilanterol	18	Very often	0	Cough, fever, dyspnea	+	No	Favipiravir 5 days (3 x 1600 mg loading, 3 x 600 mg maintenance)	No	0
8	50	F	No	Nons-allergic	Rhinitis	20.3	Negative	FEV <sub>1</sub> : 3070 ml 100% FVC: 3990 ml 112% FEV <sub>1</sub> /FVC: 77%	As needed low dose ICS/formoterol Montelukast Desloratadine	19	Sometimes	0	Cough, fever, dyspnea	+	No	Favipiravir 5 days (3 x 1600 mg loading, 3 x 600 mg maintenance)	No	0

(Continued)

**Table 2.** Clinical Characteristics of Patients with Asthma with SARS-CoV-2 Infection (Continued)

Patients	Age	Sex	Smoking Habits	Asthma Phenotype	Asthma Comorbidities	BMI (kg/m <sup>2</sup> )	Prick Test	Spirometry Before Pandemic	Asthma and Rhinitis Therapy	ACT	Asthma Therapy Adherence During the Pandemic	Number of Flare-Up with Systemic Steroid During the Pandemic	Symptoms for COVID-19	Sars-Cov2 PCR and Thorax CT Positivity*	Hospitalization	COVID-19 Treatment	Asthma Flare-Up During COVID-19	Number of Asthma Flare-Up After COVID-19 Heals
9	49	F	No	Eosinophilic	Sinusitis	27.47	Negative	FEV <sub>1</sub> : 1760 ml 62% FVC: 2860 ml 87% FEV <sub>1</sub> /FVC: 59%	High dose ICS + formoterol Montelukast Mometasone nasal	21	Very often	1	Myalgia, throat ache	++	No	Favipiravir 5 days (3 x 1600 mg loading, 3 x 600 mg maintenance) Enoxaparin sodium 35 days (40 mg 1 x 1)	Yes	0
10	48	M	Ex-smoker 10 package-year	Obese asthma Allergic	No	31.5	<i>D. Pteromyssinus</i> <i>D. Farnae</i> Mixed tree pollen	FEV <sub>1</sub> : 4230 ml 101% FVC: 5270 ml 104% FEV <sub>1</sub> /FVC: 80%	Medium dose ICS + formoterol	19	Never	0	Fever, myalgia, cough	+	No	Favipiravir 10 days (3 x 1600 mg loading, 3 x 600 mg maintenance) ASA 100.1 x 1.4 days	No	0
11	57	F	no	Obese asthma	Rhinitis	31	Negative	FEV <sub>1</sub> : 2800 ml 96% FVC: 3490 ml 103% FEV <sub>1</sub> /FVC: 80%	Medium dose ICS + formoterol Desloratadine	22	Very often	1	Dyspnea, fever	+	Yes	Favipiravir 10 days (3 x 1600 mg loading, 3 x 600 mg maintenance) ASA 100.1 x 1.30 days Enoxaparin sodium 5 days (40 mg 1 x 1) Hydroxychloroquine 5 days (200 mg 2 x 1)	No	1
12	81	F	Ex-smoker 15 package-year	Smoking-related and obese asthma	DM HT	30.54	Negative	FEV <sub>1</sub> : 860 ml 67% FVC: 1460 ml 90% FEV <sub>1</sub> /FVC: 59%	Low dose ICS + vilanterol Tiotropium	20	Very often	1	Dyspnea, fever, myalgia	+	No	Favipiravir 5 days (3 x 1600 mg loading, 3 x 600 mg maintenance) Enoxaparin sodium 10 days (40 mg 1 x 1)	Yes	0
13	59	M	No	Eosinophilic Allergic	Allergic rhinitis	24	<i>Aspergillus fumigatus</i>	FEV <sub>1</sub> : 1910 ml 55% FVC: 3510 ml 90% FEV <sub>1</sub> /FVC: 73%	Nepolizumab High dose ICS + formoterol Mometasone nasal	24	Very often	0	Fever, weakness	+	No	Favipiravir 5 days (3 x 1600 mg loading, 3 x 600 mg maintenance)	No	0

\*The positivity with PCR is +, the positivity with PCR and CT is ++.  
ACT, asthma control test; ASA, acetyl salicylic acid; BMI, body mass index; COVID-19, coronavirus disease 2019; CT, computed tomography; DM, diabetes mellitus; F, female; FEV<sub>1</sub>, forced expiratory volume in 1 second; FVC, forced vital capacity; HT, hypertension; ICS, inhaled corticosteroids; M, male; PCR, polymerase chain reaction; Sars-Cov2, severe acute respiratory syndrome Coronavirus 2.



Rate of death from COVID-19 was 0.89 in the general population while no death from COVID-19 was seen in our asthma patients. Two patients were admitted to the hospital because of hypoxemia and deterioration of general health status. Only one of them was given tocilizumab. No patient required monitoring in the ICU.

### Limitations

No information was obtained on COVID-19 from the patients not reached by telephone or those not giving consent. The fact that the study was cross-sectional, based on patients' descriptions, limited number, conducted in a single tertiary center, can be seen as another limitation.

### CONCLUSION

Obesity phenotype increases risk of experiencing COVID-19 in the patients with asthma. Having severe asthma or biologic agent therapies may be a factor that increases the risk of COVID-19. Asthma exacerbation may occur during or following COVID-19 infection. Non-adherence to the treatment has been observed to be a factor increasing the risk. Our study is original in that it reflects the 9-month long-term pandemic effects of Turkish asthma patients in the pre-vaccination period in Turkey.

**Ethics Committee Approval:** This study was approved by Ethics committee of Cerrahpaşa Faculty of Medicine (Approval number 23786442-604.01-01-136636).

**Informed Consent:** Verbal informed consent was obtained from the patients who agreed to take part in the study.

**Peer-review:** Externally peer-reviewed.

**Author Contributions:** Design – B.G., B.Ç.Ö., N.G.M.; Data Collection and/or Processing – E.B.Ç., A.A.T., B.G., B.Ç.Ö., N.G.M.; Analysis and/or Interpretation – B.G., B.Ç.Ö., N.G.M.; Literature Search – B.G., B.Ç.Ö., N.G.M.; Writing Manuscript – B.G., B.Ç.Ö., N.G.M.; Critical Review – B.G., B.Ç.Ö., N.G.M., E.B.Ç., A.A.T.

**Conflict of Interest:** The authors have no conflict of interest to declare.

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