Original Article

Allergic Rhinitis in Covid-19 Patients

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ABSTRACT

Background: Coronavirus disease-2019 (Covid-19) is transmitted by respiratory droplets and causes upper respiratory tract symptoms. These features of Covid-19 are essential regarding its potential association with allergic rhinitis (AR). **Aim:** This study aimed to investigate the relationship between Covid-19 and AR and the effects of Covid-19 in patients with AR. **Patients and Methods:** Between April 2020 and June 2020, in Sanliurfa Mehmet Akif Inan Training and Research Hospital, 322 patients who were diagnosed with Covid-19 with polymerase chain reaction (PCR) positive oropharyngeal and nasopharyngeal swab samples and with AR in their medical history were detected using the hospital's automation system. Demographic data including age, gender, and additional data such as main complaints, physical examination findings, duration of inpatient floor, and intensive care unit (ICU) stay were recorded. The medical history of the patients was reviewed and patients with previously diagnosed AR were identified. These patients were called by phone and their AR diagnoses were confirmed by performing the Score for Allergic Rhinitis (SFAR) questionnaire. **Results:** The study population consisted of 322 patients aged between 18 and 85. Among these patients, 186 (57.8%) were male and 136 (42.2%) were female. Nineteen (5.9%) of these patients had a history of AR. There was no difference between the patients with and without a history of AR concerning age, gender distribution, type of presentation, ICU referral rate, duration of inpatient floor, and ICU stay ($P > 0.05$). **Conclusion:** We conclude that the prognosis of Covid-19 was similar between patients with and without AR. The incidence of AR was relatively lower among patients with Covid-19.

Keywords: *Allergic diseases, allergic rhinitis, Covid-19, severity, SFAR*

Introduction

Coronavirus disease-2019 (COVID-19) was initially diagnosed in December 2019 in Wuhan, China in a patient with pneumonia. After its worldwide spread, World Health Organization (WHO) declared a pandemic on March 11, 2020. The first case in Turkey was also diagnosed on March 11, 2020.[1] The most frequent symptoms of this highly contagious disease are fatigue, high fever, and dry cough.[2] COVID-19 is transmitted by respiratory droplets. Thus, it can be transmitted by coughing, sneezing, or contact with other people with the respiratory droplets of infected patients.[3]

Immunoglobulin E-mediated type 1 hypersensitivity reactions are involved in the pathogenesis of allergic rhinitis (AR). It is an inflammatory nasal mucosal disease characterized by episodes of repetitive sneezing, profuse and watery nasal discharge, nasal congestion, and itching.[4]

The relationship between AR and COVID-19 is important since severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a respiratory tract pathogen.[5] The impact of AR and asthma on Covid 19 disease progression is controversial. There are interesting data in recent studies showing that allergic diseases are

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protective against Covid 19 disease.[6,7] It was reported that COVID-19 had a mild course in children with allergic diseases as in healthy children.[5] On the other hand, in another study, Covid 19 disease was observed to be more severe in patients with AR and asthma, especially non-allergic asthma.[8]

Understanding the relationship between chronic diseases and COVID-19 is essential for taking specific precautions, early diagnosis, and treatment. It was reported that the morbidity and mortality in COVID-19 patients were related to underlying chronic conditions including hypertension, cardiovascular diseases, and obesity. It was shown that asthma was not associated with an increased risk of COVID-19 and COVID-19 did not have a relatively worse prognosis in patients with asthma.[9,10]

Unfortunately, there are not enough studies in the literature on the relationship between Covid-19 and AR. For this reason, we aimed to contribute to the literature with our study by examining the relationship between AR and Covid-19 disease progression.

Materials and Methods

The study enrolled 322 patients who had a history of AR and who had positive reverse transcriptase–polymerase chain reaction Bio-Speedy® SARS-CoV-2 Double Gene RT-PCR Kit (Bioeksen, Istanbul, Turkey) (RT-PCR) tests for Covid-19 at Sanliurfa Mehmet Akif Inan Training and Research Hospital, between April 15 and June 15, 2020. This study was approved by the Ethical Review Committee of the University of Health Sciences, Sanliurfa Mehmet Akif Inan Training and Research Hospital. Data of these patients including age, gender, chief complaint, physical examination findings, duration of inpatient floor, and intensive care unit (ICU) stay were reviewed. All patients were called by phone and the Score For Allergic Rhinitis (SFAR) questionnaire was completed before making the diagnosis of AR.[11] The SFAR questionnaire was validated for diagnosing AR and it does not necessitate the performance of a laboratory test. The SFAR score was calculated for all patients and those with a score of SFAR ≥7 were considered to have AR [Table 1].[11] Patients who could not be reached by phone or who had incomplete data were excluded.

Statistical analysis

Data analysis was performed using IBM SPSS Statistics version 17.0 software (IBM Corporation, Armonk, NY, USA). Whether the distributions of continuous variables were normal or not was determined using the Kolmogorov–Smirnov test. Descriptive statistics for continuous variables were expressed as mean ± SD or median (min-max), where appropriate. The number of cases and percentages were used for categorical data. The mean differences between the two independent groups were compared by the Student's *t*-test. The continuous variables, for which the parametrical test assumptions were not met, were evaluated by Mann–Whitney U or Kruskal Wallis tests depending on the number of independent groups. Categorical data were analyzed by Pearson's χ^2 or Fisher's exact test, where applicable. Degrees of association between continuous variables were evaluated using Spearman's rank-order correlation analyses. Multiple logistic regression analysis was performed to examine the best predictor(s), which affect ICU requirements. On the other hand, multiple linear regression analysis was applied for determining the best predictor(s) that affect the duration of stay at the hospital. Because of not normal distribution, logarithmic transformation was used for the duration of stay at the hospital in regression analysis. Odds ratios, coefficient of regression, and 95% confidence intervals for each independent variable were also calculated. $P < 0.05$ was considered statistically significant.

Results

The study cohort included 322 patients; among these

Table 1: The SFAR scoring system

Items/discriminators	Score (points) attributed by experts
Blocked nose, runny nose, sneezing in the past year	1 for each symptom
Months of year	1 for perennial 1 for pollen season
Nasal symptoms + itchy eyes	2
Triggers	
Pollens, house dust mites	2
Epithelia (dogs, cats)	1
Perceived allergic status	2
Previous positive allergic tests	2
Previous medical diagnosis of allergy	1
Family history of allergy	2

Table 2: Demographic and clinical features

	n=322
Age (years)	39.8±15.9
Age range (year)	15-85
Gender	
Male	186 (57.8%)
Female	136 (42.2%)
Type of presentation	
Screening	100 (31.1%)
Symptomatic	222 (68.9%)
Allergic rhinitis	19 (5.9%)
ICU referral	21 (6.5%)
Duration of ICU stay (days)	14 (5-16)
Duration of hospital stay (days)	6 (3-21)

Table 3: Rates of chief complaints

	Number of patients	Percentage
High fever	94	29.2
Cough	84	26.1
Sore throat	74	23.0
Fatigue	59	18.3
Headache	52	16.1
Diarrhea	30	9.3
Dyspnea	30	9.3
Arthralgia	25	7.8
Hoarseness	5	1.5

Table 4: Comparison of two groups regarding demographic and clinical parameters

	AR- (*n*=303)	AR+ (*n*=19)	*P*
Age (year)	40.1±16.0	34.8±13.9	0.164†
Gender			0.820‡
Male	176 (58.1%)	10 (52.6%)	
Female	127 (41.9%)	9 (47.4%)	
Type of presentation			0.474‡
Screening	96 (31.7%)	4 (21.1%)	
Symptomatic	207 (68.3%)	15 (78.9%)	
ICU referral	20 (6.6%)	1 (5.3%)	>0.999¥
Duration of ICU stay (days)	13 (5-16)	16 (N/A-N/A)	N/A
Duration of hospital stay (day)	6 (3-21)	6 (4-21)	0.456$

†Student's *t*-test, ‡Continuity corrected χ^2 test, ¶Pearson's χ^2 test, ¥Fisher's exact test, $Mann-Whitney *U* test, N/A: Not applicable. AR: Allergic rhinitis

patients, 186 (57.8%) were male while 136 (42.2%) were female. Two hundred and twenty-two (68.9%) patients underwent a COVID-19 PCR test after presentation with complaints. The remaining 100 (31.1%) patients were tested for screening purposes. Nineteen (5.9%) patients had a history of AR. Demographic and clinical data of the study patients and the statistical analysis results are displayed in Table 2.

The chief complaints were high fever, cough, sore throat, fatigue, headache, diarrhea, dyspnea, arthralgia, and hoarseness.

The rates of chief complaints encountered in the study population are listed in Table 3.

Comparison of the patients with and without AR showed that groups were similar regarding mean patient age, gender distribution, type of presentation, ICU referral rate, duration of inpatient floor, and ICU stays ($P > 0.05$).

Results of the comparison between the patients with and without AR concerning demographic and clinical parameters are displayed in Table 4.

A comparison of the patient groups with and without a history of AR regarding symptomatology revealed that the two groups were similar regarding the rates of all chief complaints except for the sore throat ($P > 0.05$). The rate of sore throat was significantly higher in the former group (i.e. AR+) than the latter (AR-) ($P = 0.004$).

Table 5: The symptomatology of patients with and without history of AR

	AR- (*n*=303)	AR+ (*n*=19)	*P*
High fever	85 (28.1%)	9 (47.4%)	0.124†
Cough	79 (26.1%)	5 (26.3%)	>0.999‡
Sore throat	64 (21.1%)	10 (52.6%)	0.004‡
Fatigue	55 (18.2%)	4 (21.1%)	0.760‡
Headache	49 (16.2%)	3 (15.8%)	>0.999‡
Diarrhea	28 (9.2%)	2 (10.5%)	0.693‡
Dyspnea	30 (9.9%)	0 (0.0%)	0.235‡
Arthralgia	24 (7.9%)	1 (5.3%)	>0.999‡
Hoarseness	3 (1.0%)	1 (5.3%)	0.217‡

†Continuity corrected χ^2 test, ‡Fisher's exact test, N/A: Not applicable. AR: Allergic rhinitis

Table 6: Comparison of the demographic and clinical features of the patients who were referred to ICU with the other patients

	ICU- (*n*=301)	ICU+ (*n*=21)	*P*
Age (year)	38.3±14.8	60.9±16.3	<0.001†
Gender			0.279‡
Male	171 (56.8%)	15 (71.4%)	
Female	130 (43.2%)	6 (28.6%)	
AR	18 (6.0%)	1 (4.8%)	>0.999¥

†Student's *t*-test, ‡Continuity corrected χ^2 test, ¶Pearson's χ^2 test, ¥Fisher's exact test, N/A: Not applicable. ICU: Intensive care unit AR: Allergic rhinitis

The mean age of the patients who were referred to the ICU was significantly higher than those who were not referred to ICU ($P < 0.001$). However, there was no significant association between ICU referral and a history of AR ($P > 0.05$).

Results of the comparative analysis between the patients who were referred to the ICU and those who stayed on the inpatient floor concerning demographic and clinical data are shown in Table 6.

Discussion

The SARS-CoV-2 virus caused a pandemia in 2020, which affected both social life and the medical community. It was reported that patients with preexisting comorbidities had relatively higher Covid-19-related mortality risk.[12] The impact of AR and asthma on Covid 19 disease progression is controversial. There are interesting data in recent studies showing that allergic diseases are protective against Covid 19 disease.[6,7]

It was reported that COVID-19 had a mild course in children with allergic diseases as in healthy children.[5] On the other hand, in another study, Covid 19 disease was observed to be more severe in patients with AR and asthma, especially non-allergic asthma.[8]

Our study showed that there was no significant difference between patients with and without a history of AR regarding the length of hospital stay, ICU stays, and ICU referral rates. Only the rate of sore throat was significantly higher in patients with a history of AR than in the others. We postulate that chronic nasal obstruction and mouth breathing in patients with AR can be the underlying reason for this finding.

According to epidemiological studies conducted in different countries, the prevalence of AR is in the range of 3–19%.[13] These studies also reported that the incidence of seasonal AR (SAR) was 10%, while the incidence of perennial AR was between 10% and 20% in the general patient population. In these studies, questionnaires and phone calls were used as the main research tools. In our study, we followed a similar approach.

In a study conducted in Wuhan, China, where the index COVID-19 case was diagnosed, it was reported that 36 of 182 (19.8%) COVID-19 patients had AR (14). This figure is close to the rate of AR in children living in Wuhan (i.e., 17.6%).[14] In our study, we determined the rate of AR as 5,9% in the adult patient population with COVID-19. This rate is lower than the rates of AR in the general population of our country (i.e. 11.8–36.4%).[15] This finding suggests that patients with AR may have a relatively lower risk of COVID-19. Since there are only a limited number of studies regarding the potential relationship between viral infections and AR, it is difficult to comment on this finding.[16,17] In a Dutch study, it was reported that there was an inverse correlation between the pollen counts and influenza rates probably due to the fact that an immune system stimulated by the pollens could be protective against viral respiratory diseases.[16] These authors also stated that influenza-like viruses could not survive if there were a high pollen load in the air and pollens acted as a safety wall against the viral spread. Hellings *et al.*[17] denoted that allergic inflammation could be protective against viral rhinitis. It was stated that the interferon-g secreted by the T helper cells after exposure to the allergen had antiviral effects as the mediators such as eosinophilic cationic protein (ECP) secreted by the activated eosinophils.[18] The same researchers also stated that the potential protective effects of these processes against viral agents could be influenced by the virulence of the virus, innate immunity of the patient, and environmental factors.

An important finding at the molecular level has been reached in a recent study examining the relationship between allergy and Covid-19. Angiotensin-converting enzyme 2 (ACE2) is the cell entry receptor for SARS-CoV-2. It is argued that Covid 19 is milder in patients with asthma and AR due to the decrease in the expression of this enzyme.[7] However, in our study, the severity of Covid-19 was similar between patients with and without a history of AR.

Conclusion

Our findings suggest that Covid-19 is less prevalent in patients with AR. The severity of Covid-19 was similar between patients with and without a history of AR and the incidence of AR was lower in patients with Covid-19 than in the general population. However, these findings need to be confirmed in studies conducted with a large sample size.

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Conflicts of interest

There are no conflicts of interest.

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