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Observation of COVID-19 Vaccinated and Unvaccinated Patients

Gokhan Guner[1], Yusuf Yurumez [1], Ensar Durmus [1], Fatih Guneysu [1], Nuray Aslan [1]

[1] Department of Emergency Service, Sakarya University Training and Research Hospital Emergency Service/ Adapazari/ Sakarya/ Turkey

ORIGINAL RESEARCH PAPER

Abstract

In this study, the patients over 60 with Coronavirus 2019 (COVID-19) reverse transcription polymerase chain reaction (RT-PCR) positive even though they were vaccinated against COVID-19, and their length of stay in hosptal (LoS), intensive care unit (ICU) need, mortality rate, and laboratory parameters were examined. This research is an observational, retrospective, and descriptive study. The RT-PCR positive inpatients over 60 who were not vaccinated against COVID-19 who applied to Sakarya University Training and Research Hospital (SEAH) emergency room (ER) between October 1- December 31/2020 were included in the first group, and after at least one dose of COVID-19 vaccination, RT-PCR positive inpatients between February 1 - April 31/2021 were included in the second group.There were 1455 patients in group one and 97 cases in group two, and the LoS was eight days (IQR: 4-12) in group one and six days (IQR: 5-9) in group two (p=0.039). The mortality rate was 32.5% in the first group and 20.6% in the second group (p=0.018). Ferritin level was lower in group two compared to the first group. [Group one: 418.9 (216.2-823.7), group two: 302.6 (155.5-580.5), p=0.001].
In RT-PCR positive COVID-19 cases, shortening of LoS in hospital, reducing mortality rate, and decreasing ferritin level can be achieved with COVID-19 vaccination.

Key words: COVID-19, elderly, mortality, vaccine, emergency room

I. INTRODUCTION

As of 21.01.2022, there have been 340.543.962 confirmed cases of Coronavirus 2019 (COVID-19), including 5.570.163 deaths, reported to WHO. As of 18.01.2022, 9.571.502.663 vaccine doses have been administered [1].
Drugs such as favipiravir, ribavirin, lopinavir, chloroquine/hydroxychloroquine, ivermectin, tokilizumab and dexamethasone have been used in the treatment of COVID-19 so far [2]. In addition, strategies to reduce social contagion such as stopping flights, closing the borders of the country, curfew, and social distance practices have been implemented in most countries [3]. While decreasing the spread of the disease, these strategies paradoxically prevented society from gaining immunity against COVID-19 and made society sensitive to the waves of infection. If a global vaccine program is implemented together with safe and effective vaccines, one of the most effective public health interventions that modern medicine can offer, it is possible to return to the average period before the pandemic [4].
The World Health Organization (WHO) announced that 95% of deaths due to COVID-19 were seen in individuals over 60, and this age group is at risk of serious illness [5]. Studies have also found that the mortality rate is associated with advanced age and comorbidities; besides, the condition of elderly patients deteriorates more rapidly, and the disease is more severe than younger patients [6], [7]. In the UK, it was determined that the elderly population constituted a large part of the burden of health facilities in the pandemic, and the elderly were decided as the first group to be vaccinated due to the high mortality rates in the older age group [8]. Similarly, in Turkey, the elderly population is primarily involved in the vaccination program [9].
When research on the efficacy levels of vaccines is analyzed, it has been specified that individuals may experience COVID-19 despite being vaccinated [10], [11]. In this study, laboratory parameters, length of hospital stay, hospitalization in the intensive care unit, and mortality status of vaccinated and

Corresponding author: Dr Ensar DURMUS
Sakarya University Training and Research Hospital, Emergency Service
Phone Number: +90 264 888 40 00
Fax Number: +90 264 275 91 92
Mobile Phone Number: +90 505 866 57 82
e-mail: ensar.durmus@saglik.gov.tr

unvaccinated COVID-19 reverse transcription polymerase chain reaction (RT-PCR) positive patients over the age of 60 will be compared. Thus, it is aimed to contribute to the current medical literature, which has limited information about the vaccination against COVID-19 results.

II. MATERIAL AND METHODS

II.1. Research Type

This study is an observational, retrospective, and descriptive study. The study population consists of vaccinated and unvaccinated RT-PCR positive COVID-19 patients. The study sample group is RT-PCR positive vaccinated and unvaccinated COVID-19 patients were hospitalized from the Sakarya University Training and Research Hospital (SEAH) adult emergency room (ER).

II.2. Study Design

RT-PCR test was performed on patients who applied to the ER with symptoms of COVID-19. RT-PCR positive patients were evaluated in terms of outpatient follow-up, hospitalization status, and necessity of ICU, according to the Ministry of Health COVID-19 guidelines [12]. In the study, the patients were divided into 2 groups:

- Group 1: Unvaccinated, RT-PCR positive COVID-19 patients aged 60 and over who applied to the ER and were hospitalized between 01.10.2020-31.12.2020.

Inclusion criteria

- The patient's age of 60 and above
- Positive RT-PCR test
- Hospitalization after applying to ER of SEAH
- Complete access to data from the automation system
- Exclusion criteria
- Patients younger than 60 years of age,
- RT-PCR negative patients,
- Outpatients,
- Patients whose patient file is not fully accessible,
- Patients who have caught COVID-19 for the second time,
- Patients admitted to the hospital other than the ER.

- Group 2: Patients who applied to the ER and were hospitalized due to COVID-19 after at least 1 dose of vaccination between 01.02.2021 and 30.04.2021.

Group 2 must have been vaccinated with at least one dose of CoronaVac vaccine (Sinovac Life Sciences) in addition to Group 1. Other inclusions and exclusion criteria are the same as for Group 1.

II.3 Data Collection

Demographic data of the patients (age, gender), ER test results, hospitalization in the ICU, LoS in hospital, and mortality status were obtained from patient files and the hospital automation system.

II.4. Statistical Analysis

The rule of three was used to calculate 95% CI in categories with no events. For continuous variables that do not fit the normal distribution according to the Kolmogorov-Smirnov test of normality Mann–Whitney U-test was used, and the $\chi 2$ test was used to compare endpoints expressed as categorically. All tests were performed with a two-sided significance of 5%. For each endpoint, the absolute and relative effects and their corresponding 95% CIs were calculated as recommended by Altman et al. [13]. All analyses were performed using the IBM SPSS Statistics for Windows, Version 21.0 (IBM Corp. Released 2012, Armonk, NY: IBM Corp.).

II.5. Ethics Committee Approval

Approval for this study was obtained from the Sakarya University Faculty of Medicine Ethics Committee. (IRB No: E-71522473-050.01.04-32192-309)

III. RESULTS AND DISCUSSION

Between 01.10.2020 and 31.12.2020, the number of patients over 60 diagnosed with COVID-19 and hospitalized in SEAH adult ER was found as 1455 (Group 1). On the other hand, between 01.02.2021 and 30.04.2021, the number of COVID-19 RT-PCR positive patients over 60 were hospitalized with at least one dose of Coronovac vaccine was discovered to be 97 (Group 2). While the median age of all patients was 73 (67-80), 55.7% of them were male. It was defined that RT-PCR test positivity of group 2 patients emerged on an average of 22.9 (SD=16.8) days after vaccination.

When the age and gender distribution of Group 1 and Group 2 patients were compared, no statistically significant difference was seen ($p=0.141$, $p=0.307$, respectively).

When LoS in the hospital was compared between the groups, it was recognized that Group 2 had remarkably shorter than Group 1 ($U=56172{,}500$, $p=0.039$, $z=-2.066$, $r=-0.05$). While there was no difference in ICU hospitalization rates between the two groups, the mortality rate was significantly lower in Group 2 (respectively; $\chi 2=3.661$, $p=0.056$, $\chi 2=5.931$, $p=0.015$) (Table 1).

When the two groups were evaluated in laboratory values, no statistical distinction was marked between D-dimer, CRP, lymphocyte, and lymphocyte percentages.

On the other hand, it was located that the ferritin value was statistically significantly lower in Group 2 ($U=45515.00$, $p=0.001$, $z=-3.224$, $r=-0.09$) (Table 1).

In the fight against a public health crisis such as a pandemic, the availability of a vaccine and its implementation with a correct global vaccination program are vital [14].

In particular, the early vaccination of the elderly population, associated with mortality in studies and constitutes an essential part of the density in health facilities in the pandemic, has been the health policy of many countries [7], [9], [15].

Table 1. Comparison of patient groups according to variables.

Variable		Group 1 (n=1455)	Group 2 (n=97)	p-value*
Gender	Female (n; %)	637 (44)	50 (52)	0.141
	Male (n; %)	818 (56)	47 (49)	
Median Age (IQR)		73 (67-80)	71 (66-79)	0.307
Median LoS in hospital (IQR)		8 (4-12)	6 (5-9)	0.039
Inpatients counts in ICU (%)		635 (44)	52 (54)	0.056
Number of deaths (%)		473 (33)	20 (21)	0.015
Laboratory parameters	D-dimer (median; IQR)	764 (386-1640)	706 (448-1140)	0.448
	Ferritin (median; IQR)	419 (216-824)	303 (156-581)	0.001
	CRP (median; IQR)	103 (54-166)	96 (37-155)	0.657
	Lymphocyte (median; IQR)	1.1 (0.7-1.5)	1 (0.7-1.6)	0.742
	Lymphocyte ratio (median; IQR)	15 (9-23)	15 (10-26)	0.862

*Chi-square test was used for categorical values, while Mann Whitney-U test was used for continuous values.

Gold et al. reported that the LoS in the hospital median value of patients over 65 hospitalized due to COVID-19 was eight days [16]. Our study determined LoS in the hospital as eight days in Group 1 patients, while it was determined as six days in Group 2. Thus vaccination against COVID-19 may help reduce the burden on hospitals during the pandemic period.

Gold et al. and Borobia et al. reported the mortality rate of hospitalized COVID-19 patients over 65 and 60 years old as 36% [16], [17]. Similarly, in our study, the mortality rate of Group 1 was discovered to be 32.5%. On the other hand, it was regarded that the group 2 mortality rate was lower than group 1. Our results support that vaccination for a deadly disease such as COVID-19 can decrease mortality rates.

When laboratory test results are scanned, studies in the literature mention that D-dimer value may be associated with mortality [18, p. 19], [19]. However, no meaningful difference was seen in D-dimer values between the two groups in our study. In addition, the lack of significant difference in D-dimer values of cases who died and survived in Group 2 points that the Coronovac vaccine declines the mortality rate independent of D-dimer level [Group 2 non-survivor D-dimer 902.5 (438-1120), Group 2 survivor D -dimer 702 (521.3-1167.5); U=55384, p=0.579, z=-0.758, r=-0.02] (23.2).

In addition, the ferritin level, which is another mortality indicator in the literature, was noticed to be descending in Group 2, which was consistent with the literature [20], [21]. The most important limitation of our research is that our study was single-centered, and patients could apply to other institutions for treatment. In addition, the fact that other COVID-19 vaccines have not yet been used during the study period is another limitation. In addition, the constant mutation of the Coronavirus limits the results of our study due to the dominant virus subtype during the study period.

IV. CONCLUSION

It can be displayed that the COVID-19 vaccine shortens the LoS in hospitals, reduces the mortality rate, and causes a lower ferritin level in the group of COVID-19 patients over 60 who need hospitalization. However, more studies are required to comprehend the effectiveness of COVID-19 vaccines on patients.

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