

Review of COVID-19 vaccinated patients' emergency room admissions

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ABSTRACT

Introduction: This study was aimed to define the demographic structure of vaccinated patients admitted to the emergency room (ER) with COVID-19 symptoms, and their hospitalization status, length of stay (LoS) in hospital, and mortality status.

Material and Method: This research is a retrospective, cross-sectional and descriptive study. Furthermore, it includes the period between 15.01.2021 and 30.04.2021.

Results: An 887 COVID-19 vaccinated patients who applied to ER. Of these, 383 (42.2%) were male, and 504 (56.8%) were female. The mean age of the patients was 52 ± 18.6 years. The number of single-dose vaccinated patients was 696 (78.5%), and the two-dose vaccinated was 191 (21.5%). CoronaVac (Sinovac Life Sciences) vaccine was applied to 755 (85.1%), and BNT162b2 (Pfizer & Biontech) vaccine was applied to 132 (14.9%) patients before.

In 317 (35.7%) cases, reverse transcription-polymerase chain reaction (Rt-PCR) positivity was detected in the ER application after vaccination. Of the total patients, 86 (9.7%) were hospitalized, 14 (1.4%) patients died in the hospital.

The mean time between vaccination and application to ER was $25 (\pm 21.9)$ days. Also, this period was $28.1 (\pm 18)$ days in two-dose vaccinated patients.

Conclusion: People who are vaccinated with the COVID-19 vaccine continue to have hospital admissions with COVID-19 symptoms. Rt-PCR positivity, need for hospitalization, and mortality may continue to be seen in vaccinated individuals.

Keywords: Pandemic, COVID-19, vaccine, emergency room

INTRODUCTION

Since the World Health Organization (WHO) declared the COVID-19 pandemic in March 2020, health officials have been looking for a method to combat this disease (1). On the one hand, measures were taken to reduce the spread of the virus, such as social isolation, wearing masks, public transportation regulations, and curfew; on the other hand, investigations were conducted to treat infected cases (2,3). Although many drugs have been used to manage the disease in the early days, there is still no definitive method to treat the infection (4).

The high mortality rate in hospitalized patients, the long hospitalization period of the patients, the significant rate of patients in need of intensive care, and the extensive mortality have pointed that other resolutions should be queried. As a solution, COVID-19 vaccine research has been initiated globally and has progressed rapidly (5).

It is unknown exactly what effect the mutant viruses will have on vaccines when the SARS-CoV-2 virus mutates

(6). It is troubling that the progress in potential virus pathogenicity due to mutations will create challenges in drug and vaccine improvement levels (7). On the other hand, a suitable vaccine is demanded to help fight disease; furthermore, especially to have a protective effect against severe diseases and mortality (8).

Vaccination programs against COVID-19 have commenced in Turkey since January/2021. In the first place, healthcare workers, immunosuppressed patients, cancer patients, and the elderly population were vaccinated with the inactive CoronaVac vaccine (Sinovac Life Sciences). Later, mRNA vaccines BNT162b2 (Pfizer & Biontech) were added to the vaccine program, leaving the patient preference. As of 30.04.2021, Turkey has risen to sixth place among the countries that have applied the most COVID-19 vaccine globally, and it has applied the first dose to 13,715,749 people and the second dose to 9,107,089 people (9,10).

In this study, the general characteristics of the patients who were vaccinated with CoronaVac or BNT162b2 vaccines in Sakarya Province of Turkey and administered to Sakarya Training and Research Hospital (SEAH) emergency room (ER) were examined. It is aimed to define the demographic structure of patients admitted to the ER with COVID-19 symptoms after vaccination, hospitalization status, length of stay (LoS), and mortality. In this way contribute to the current medical literature with a limited number of publications on this subject.

MATERIAL AND METHOD

The study protocol was approved by the Sakarya University Faculty of Medicine Non-Interventional Ethics Committee (Date: 28.04.2021, Decision No: 310). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

Research Type

This research is a retrospective, cross-sectional and descriptive study. Furthermore, it includes the period between 15.01.2021 and 30.04.2021.

The study sample was the patients who presented to the SEAH adult ER with COVID-19 symptoms after being vaccinated with CoronaVac or BNT162b2. The study population was the vaccinated patients who applied to the ER with the findings of COVID-19.

Definitions

CoronaVac is an inactive vaccine, and BNT162b2 is an mRNA vaccine, and these vaccines are applied in two doses. By the Ministry of Health's vaccine application strategy, vaccines are applied in two doses at four-week intervals (11). Primarily, healthcare workers, people living in elderly nursing homes, and older adults over 65 were vaccinated in Turkey (11).

Fever, cough, dyspnea, sore throat, headache, myalgia, loss of taste and smell, or diarrhea have been affirmed as COVID-19 symptoms (12). Rt-PCR was analyzed by taking oropharyngeal and nasopharyngeal combined swabs in all cases with COVID-19 symptoms. Only patients with a positive Rt-PCR test were recognized positive in the study.

Inclusion Criteria

Among patients vaccinated with at least one dose of CoronaVac or BNT162b2, the following were included in the study:

- Patients aged 18 and over,
- Patients with at least one COVID-19 symptom,
- Patients admitted to the XEAH ER,

- Patients whose information could be accessed fully from the hospital automation system.

Exclusion Criteria

- Patients younger than 18 years old,
- Pregnant patients,
- COVID-19 patients who have never been vaccinated with COVID-19 vaccines,
- Patients who applied to the ER with a complaint other than COVID-19 symptoms,
- Patients whose information could not be fully reached were excluded from the study.

Data Collection

The data of the cases that applied to the XEAH ER during the study period was reached from the hospital automation system and patient files. Patients' age, gender information, the name of the applied vaccine, the number of vaccine's dose, the time between vaccination and admission to the ER, Rt-PCR positivity after vaccination, hospitalization status, length of stay (LoS) in hospital, and mortality status of the inpatients were retrospectively scanned.

Statistical Analysis

The collected data were analyzed with the IBM SPSS Statistics for Windows, Version 21.0 (IBM Corp. Released 2012, Armonk, NY: IBM Corp.). Skewness and Kurtosis results were verified to be in the range of $-2/+2$ for the data's normal distribution (13). Chi-square test was utilized for comparison of categorical data, and resulted with $p < 0.05$ were accepted statistically meaningful.

An independent t-test was applied to compare two independent data groups that were normally distributed, and results with $p < 0.05$ were considered significant.

RESULTS

An 887 COVID-19 vaccinated patients who applied to ER with COVID-19 symptoms were included in the study. Of these, 383 (42.2%) were male, and 504 (56.8%) were female. The mean age of the patients was 52 (± 18.6) years, the median value was 56, and the age range was between 20-94 years.

The number of single-dose vaccinated patients admitted to the ER was 696 (78.5%), and the number of two doses vaccinated patients admitted was 191 (21.5%). The Coronavac vaccine was applied to 755 (85.1%) of the patients; the BNT162b2 vaccine was also applied to 132 (14.9%).

In 317 (35.7%) cases, Rt-PCR positivity was detected in the ER application after vaccination. Of the total patients, 86 (9.7%) were hospitalized; furthermore, 14 patients (1.4%) died during the treatment in the hospital.

The mean time between vaccination and application to ER was 25 (±21.9) days, and the median value was 18 days. This period was 28.1 (±18) days in two-dose vaccinated patients, and the median value was 26 days. The time to apply to ER was longer in those who were vaccinated with two doses.

The patients's gender and mean age, post-vaccination Rt-PCR positivity, hospitalization and mortality status were compared in **Table**. Accordingly, no significant relationship was observed between the patients' gender and their PCR positivity or hospitalization status (respectively; $\chi^2=1.665$, $SD=1$, $p=0.197$ and $\chi^2=1.806$, $SD=1$, $p=0.179$). There was a significant difference between the genders and the mortality status that mortality was higher in male patients ($\chi^2=4.627$, $SD=1$, $p=0.031$). According to the independent t-test results, Rt-PCR positive patients' mean age (mean=57, $SD=17$) was found to be significantly higher than Rt-PCR negative patients' mean age (Mean=49, $SD=18.9$) [$t(714)=-5.69$, $p=0.001$]. In addition, hospitalized patients' mean age (mean=69, $SD=9.9$) was seen to be significantly higher than the outpatients (Mean=50, $SD=18.3$) [$t(157)=-15$, $p<0.001$]. Also, the mean age of the patients with mortality (mean=71, $SD=11.9$) was found to be statistically significantly higher than the surviving patients (mean=52, $SD=18.5$) [$t(14)=-5.87$, $p<0.001$].

Of those vaccinated with a single dose of Coronavac vaccine, 9 (1.6%) died, while two (1.1%) of those vaccinated with two doses. Similarly, no significant difference was observed in hospitalization status and Rt-PCR test positivity between those vaccinated with a single or two doses of the Coronavac vaccine (respectively; $\chi^2=0.337$, $SD=1$, $p=0.561$; $\chi^2=0.863$, $SD=1$, $p=0.353$).

When 14 ex-cases were examined, it was noticed that all of them were Rt-PCR positive, 12 of them were vaccinated in a single dose, and they presented to the hospital after an average of 20.5 (±14.2) days after the first dose of vaccination. In addition, the average LoS in the hospital was determined to be 8 (±4.1) days. 11

of dead patients were vaccinated with the CoronaVac vaccine and 3 with the BNT162b2 vaccine, but it was affirmed that there was no notable variation in mortality between vaccines ($p=0.450$).

DISCUSSION

Studies on hospital admissions of patients with the COVID-19 vaccine are limited in the medical literature. In a study conducted in the same region in the first months of the pandemic, 169 COVID-19 patients admitted to the ER and hospitalized were examined, and the average age of the patients was 64.3 (± 17.6) years (14). Additionally, in the same study, 56.2% of the hospitalized patients were reported to be male (14). The average age of the hospitalized patients in our study was 69.3 years (± 9.4 years), and 53.8% were women. Accordingly, it can be thought that the average age of the patients hospitalized from the ER after vaccination increased, and the rate of hospitalization of women increased. However, it can be said that giving priority to those aged 65 and over in the vaccination program causes the average age to be high. However, as of 26.04.2021, 47% of COVID-19 patients who were recently hospitalized in the USA were 60 years old and over. Moreover, 56% of these cases were female, consistent with our study results (15).

Our study observed that the Rt-PCR positivity rate of vaccinated patients who applied to the ER with COVID-19 symptoms was 35.7%. This Rt-PCR positivity rate may appear to be high compared to a vaccinated population. However, the rate of two-dose vaccinated Rt-PCR positive patients was among all patients was 8.3%.

Among all vaccinated patients, the hospitalization rate of those who applied to the ER was 9.7%, and the mortality rate was 1.58%. The mortality rate among hospitalized patients was found to be 16.3%. In a study conducted in the USA, it was reported that 21% of COVID-19 patients who were hospitalized resulted in mortality (16). In addition, Wenjie et al. found that the mortality rate in hospitalized COVID-19 cases was 25% (17).

Table. Comparison of patient data by gender and age average

Parameter	Rt-PCR						Hospitalization						Mortality			
	Positive		Negative		Statistical value	Yes		No		Statistical value	Ex		Alive		Statistical value	
	n	% ^a	N	% ^a		n	% ^a	n	% ^a		n	% ^a	n	% ^a		
Gender	Male	146	16.5	237	26.7	p=0.197 ^b	43	4.8	340	38.3	0.179 ^b	10	1.1	373	42.1	0.031 ^b
	Female	171	19.3	333	37.5		43	4.8	461	52		4	0.5	500	56.4	
Doses	1	243	27.4	453	51.1	p=0.328 ^b	64	7.2	632	71.3	p=0.337 ^b	12	1.4	684	77.1	p=0.746 ^c
	2	74	8.3	117	13.2		22	2.5	169	19.1		2	0.2	189	21.3	
Vaccine Name	CoronaVac	269	30.3	486	54.8	p=0.871 ^b	79	8.9	676	76.2	p=0.065 ^b	11	1.2	744	83.9	p=0.450 ^c
	BNT162b2	48	5.4	84	9.5		7	0.8	125	14.1		3	0.3	129	14.5	
Average Age	57		49		p=0.001 ^d	69		50		p=0.001 ^d	71		52		p=0.001 ^d	

^a: It is the ratio of all vaccinated patients, ^b: Pearson Chi-Square test, ^c: Fisher's Exact test, ^d: Independent t-test

When compared with the mortality rates of hospitalized Covid-19 patients in the literature, it can be said that the mortality rate of vaccinated patients was few.

Patients vaccinated with the BNT162b2 vaccine appear to have fewer ER admissions, hospitalizations, and lower mortality than those vaccinated with the Coronavac vaccine. This situation is controversial whether the Coronavac vaccine was applied more in the community during the study period or whether the BNT162b2 vaccine was more protective than Coronavac. There is a need for further studies on this subject as vaccination becomes more widespread in the population.

Limitations

The study included patients who applied to SEAH ER as a single-center, and the fact that the patients may have applied to another hospital was the limitation of the study.

CONCLUSION

People who are vaccinated with the COVID-19 vaccine continue to have hospital admissions with COVID-19 symptoms. Rt-PCR positivity, need for hospitalization, and mortality may continue to be seen in vaccinated individuals. However, it will be possible to have a more precise opinion with new studies.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study protocol was approved by the Sakarya University Faculty of Medicine Non-Interventional Ethics Committee (Date: 28.04.2021, Decision No: 310).

Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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