

# The Effect of Sinovac or Biontech Vaccination on Mortality in COVID-19 Patients in The Intensive Care Unit

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## ABSTRACT

**Introduction:** COVID-19 infection has spread with the development of the pandemic and is transmitted by respiratory droplets. The level of protection of vaccines administered together with the COVID-19 vaccine is the subject of research. We aimed to examine intensive care patients with Sinovac and Biontech vaccines.

**Material and Method:** After the approval of the ethics committee, 45 patient data were included in our study. Vaccination status in intensive care units was examined and patients were grouped into Sinovac and Biontech. Age, sex, comorbid conditions, and mortality rates were compared statistically. With this comparison, the effects on mortality and clinical features were evaluated.

**Results:** Forty-five patients between March 31 and December 31, 2021 were included in the study. In these patients, patients who received 2 doses of vaccine in the period before hospitalization according to the intensive care evaluation criteria were examined. Mortality rates were higher in patients who received 2 doses of Sinovac vaccine in patients hospitalized in the intensive care unit compared to those who received 2 doses of Biontech vaccine.

**Conclusion:** It was observed that the vaccination status of patients who were vaccinated with COVID-19 and taken to the intensive care unit affected mortality. Studies with larger numbers of patients are needed.

**Keywords:** COVID-19, mortality, vaccine.

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## I. INTRODUCTION

The COVID-19 pandemic, which affects the world, causes irreversible problems with many deaths. Since its emergence, it has been intensively focused on preventive measures against the disease. Vaccine studies have started in many regions around the world. There are hundreds of efforts to develop vaccines [1]. However, there are many unknowns, such as the protection rates of the vaccines being produced on COVID-19, and the effect on mortality. The potential effects of vaccination studies, such as the consequences on the society, have an important place and the most basic way to produce herd immunity is considered to be vaccination [2]. Two vaccines were used against COVID-19 infection in our country. One of them is the Biontech vaccine. This vaccine contains a modified mRNA and contains T4-based trimerization domains to enhance the immune response [3]. IgG titers were determined on the 14<sup>th</sup> day after the second dose following the Biontech vaccine administration [4]. Another vaccine used in our country is the Sinovac (Coronavac) vaccine. This vaccine is an inactivated virus vaccine [5]. It provides the formation of an IgG response with the dose of vaccine-induced immunomodulation [6]. The

importance of the protective effect of the vaccine is an indisputable fact. Considering that it is not an effective treatment method, the effect of protective measures is clearly understood. However, there are problems such as prejudices and opposition to vaccines [7]. In the literature, only the patients in the intensive care unit who were administered Biontech and Sinovac vaccines; We could not find any study examining the clinical course and mortality comparison in the intensive care unit. In our study, who were treated in the intensive care unit due to COVID-19. We aimed to contribute to the literature by comparing patients who had previously received 2 doses of Biontech or Sinovac vaccines in terms of clinical features and mortality.

## II. MATERIAL AND METHOD

After the approval of the ethics committee between 21.03.2021 and 31.12.2021, the data of all patients who were treated for COVID-19 in anesthesia intensive care units were retrospectively scanned. The data of 82 patients who were treated in the intensive care unit due to dyspnea and whose COVID-19 diagnosis was supported by the detection of nucleic acid in the respiratory tract by polymerase chain

reaction were scanned, and 44 patients who had at least two doses of Sinovac or at least two doses of Biontech vaccine were included in the study.

The condition of admitting patients to intensive care; Although at least 5 liter/min 100% oxygen support with a reservoir oxygen mask, it was observed that the respiratory rate was above 20 and the oxygen saturation was 90 and below, or there were patients who came to the emergency services with respiratory distress and received invasive mechanical ventilation support. Patients with missing data and those who were not fully vaccinated (2 doses of Sinovac or 2 doses of Biontech) were not included in the study.

The standard for taking patients to invasive mechanical ventilation support; It was applied in cases where peripheral oxygen saturation is below 90%, respiratory rate is above 20, and the hemodynamic findings of the patient deteriorate despite HFNO (high frequency nasal oxygen) or CPAP (Continuous Positive Airway Pressure) support.

After the patient data were collected, the demographic data of the patients included in the study were examined and recorded. The patients were divided into two groups as Sinovac fully vaccinated and Biontech fully vaccinated. The patients were statistically compared in terms of age, gender, length of stay, presence of 2 or more diseases, whether they were intubated or not, and death.

### III. STATISTICAL ANALYSIS

SPSS v20 program was used in the analysis of the data. Categorical variables were given as numbers and percentages, and numerical variables as mean and standard deviation. CI-Square test was used in the distribution of categorical variables between groups. The suitability of the numerical variables to the normal distribution was examined by the Kolmogorof-Smirnov test and the graphing method. Mann Whitney-U test was used for comparisons of non-normally distributed numerical variables.  $p < 0.05$  was considered statistically significant. The effects of different variables on death or discharge from the intensive care unit were analyzed by logistic regression analysis.

### IV. RESULTS

The number of patients vaccinated with Sinovac was 31 and the number of patients vaccinated with Biontech was 14. It was found that the patients who were vaccinated with Sinovac were older patients ( $p: 0.02$ ) (Table I). The number of women and men who had Biontech vaccine was equal and the number of men who had Sinovac vaccine was more than the number of women, but there was no significant difference between the groups in terms of gender ( $p: 0.47$ ) (Table I). There was no difference between the groups in terms of length of stay and presence of 2 or more diseases.  $p: 0.29$  and  $0.17$ ), respectively. The rate of intubating and connecting to invasive mechanical ventilation of the patients who had Sinovac vaccine was higher than the Biontech group ( $p: 0.00$ ). The death rate of those who had the Sinovac vaccine was found to be significantly higher than those who had the Biontech vaccine (odds ratio: 14.66 and  $p: 0.00$ ).

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service was analyzed by logistic regression and it was seen that it was affected by the vaccine (Table II).

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TABLE I: COMPARISON OF DEMOGRAPHIC CHARACTERISTICS AND CLINICAL CONDITIONS OF PATIENTS WHO RECEIVED SINOVAC AND BIONTECH VACCINE

	Sinovac (31) N-%	Biontech (14)	P
Age	74±11	65±12	0.02
Sex F/M	12/19	7/7	0.47
Duration Hospital	10±6	9±7	0.29
2 or More Comorbidity	20	6	0.17
Intubation	22	2	0.00
Death	22	2	0.00

Sinovac: Patients receiving Sinovac vaccine, BionTech: Patients receiving Biontech vaccine, F/M: Female/male ratio, Intubation: Intubated patients, Death: Number of patients who died, N: Number of patients.

TABLE II: REGRESSION ANALYSIS OF VARIABLES

	B	Standard Error	Sig	Ods Ratio
Age	0.030	0.035	0.402	1.030
Sex F/M	0.624	0.831	0.453	0.536
Duration Hospital	0.051	0.057	0.372	0.950
2 or More Disease	0.290	0.797	0.716	0.749
Vaccine	3.035	1.032	0.003	20.797

### V. DISCUSSION

In previous studies, adequate antibody production was observed in the 2<sup>nd</sup> week after 2 doses of Biontech and Sinovac (Coronavac) vaccines [8]-[10]. It is seen in some publications that the protective effect of vaccines provides protection for up to 6 months [10]. Patients who received at least two doses of vaccine and who were not 6 months after the last dose were included in our study. In their study, [11] followed the patients for 28 days after 2 doses of Coronavac vaccine were administered to 421 people. None of these patients had a neutralizing antibody response in the pre-vaccine period. After the second dose of vaccine administration, the antibody responses of the patients who were administered 3 mg and 6 mg were 95% and 100%. It has been observed that this immunization response varies with age and the type of vaccine [12]. It is known that T cell-

mediated activation plays a role in the neutralizing antibody response and mRNA vaccines stimulate this response more [13]. In our study, invasive mechanical ventilation support was applied to 22 of 31 Sinovac-vaccinated patients followed in our intensive care unit, and it was observed that these 22 patients died. Nine patients recovered from the intensive care unit and were discharged. Reference [14] in their study and clinical studies determined that the protection rate after 14 days after 2 doses of Biontech vaccine was 94%. In a similar study, there are similar protection rates after 2 doses of mRNA vaccine (Biontech) against COVID-19, but it was mentioned that reasons such as race, age and comorbid diseases may affect this protection rate regarding the effectiveness of the vaccine. It was seen that there was a total of 14 patients who were vaccinated. Two of these patients were given mechanical ventilation support in the follow-up and it was seen that they died. It was observed that the other 12 patients were discharged from the intensive care unit. In addition, when the Sinovac and Biontech vaccine groups were compared, it was found that the rates of mechanical ventilation support and death were lower in the patients who received Biontech. Gender and presence of additional disease were found to be similar in both groups. The effect of the type of vaccine administered in our study on mortality rates in intensive care patients was observed.

## VI. CONCLUSION

COVID-19 is a widespread public health threat and has caused devastating, deadly and economic problems in more than two years. In our study, we found that the rate of discharge from the intensive care unit of patients who had Biontech vaccine was higher and the rate of needing mechanical ventilator support was lower than patients who had Sinovac vaccine. According to the results of our study, Biontech vaccine; It reduces the mortality of patients treated in the intensive care unit due to COVID-19 and the need for mechanical ventilator support. It needs to be supported by more studies with larger samples. In addition to protection from COVID-19, the choice of vaccine is also important for the recovery of patients hospitalized in the intensive care unit due to COVID-19.

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