

Original Article**Clinical profile and outcome of symptomatic COVID 19 infection among vaccinated patients admitted to Teaching Hospital Jaffna**¹*Arujun R, ²Sivansuthan S*¹*Postgraduate Institute of Medicine, University of Colombo*²*General Medical Unit, Teaching Hospital Jaffna***Abstract**

COVID-19 (Corona Virus Disease) was a pandemic disease affecting the world leading to a large number of morbidity and mortality all over the world. The introduction of vaccines for this disease has been the cornerstone to fight this disease. In this study, we analyzed the clinical profile and outcome of symptomatic COVID-19 infection among vaccinated patients admitted to Teaching Hospital Jaffna.

We conducted a population-based descriptive type of observational study on symptomatic COVID-19 patients admitted to teaching hospital Jaffna who had taken at least one dose of the COVID-19 vaccine. A total number of 349 Symptomatic COVID-19 patients admitted to teaching hospital Jaffna who had taken at least one dose of COVID-19 vaccine were recruited to the study from December 2021 to March 2022. An interviewer-administered questionnaire was used to get the general information of the participants including age, gender, area of residence, and prevailing medical conditions. To decide the severity of infection and complications a data sheet was used. This was filled by checking the bedhead ticket. Data were entered into an Excel data sheet and descriptive statistics and chi-square tests were analyzed using Statistical Package for Social Sciences (SPSS) version 21.

According to the study the patients who had taken both doses had less severe illness (79.8%) compared to those who had taken a single dose (33.3%) and there was a reduction in severity with the duration of vaccination. There was no association between severity of the disease and gender but there was an increase in severity of illness and death with increasing age. Our

study also demonstrates that, with an increased number of comorbidities there is an increase in the severity of infection

In our study, all the vaccines were effective in reducing the severity of the illness. However, there are a number of patients who had severe illness despite taking the full vaccination. There are factors such as advancing age and the number of comorbidities also influence the severity of illness. There was no association between the severity of the disease and gender.

Introduction

COVID-19 affecting all parts of the world leading to more than 83 million known cases by the end of 2020 caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). However, the deployment of vaccines and antibody therapies has led to tremendous progress in the management of this disease. Targeting the viral spike protein is the main strategy used in the production of vaccines. However, the viral variants and mutations that occur along with these vaccines, reduce the efficacy of these vaccines. [1]

Vaccine effectiveness (VE) is the term used to describe the effectiveness of the vaccine against the virus. This vaccine's effectiveness varies from vaccine to vaccine. This is estimated to be 60-90% for preventing COVID-19 infection 2 weeks after receiving the second dose of Pfizer, Moderna, or AstraZeneca vaccines. [2,3] Although there is a higher degree of protection provided against COVID-19 infection by vaccines, no vaccine is 100% effective. So it is expected that a small proportion of vaccinated individuals may become infected with COVID-19 disease. When COVID-19 cases occur following vaccination, there is

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evidence that vaccines reduce symptomatic infection, the severity of illness, as well as transmission.[4,5] The vaccine effectiveness in the prevention of serious outcomes such as hospitalizations and intensive care unit (ICU) admissions and death ranges between 70-90%. Vaccine effectiveness also may be impacted by COVID-19 variants of concern. Evidence has shown that the B.1.1.7 (Alpha) variant has less significant impact on vaccine effectiveness. [6] However, the B.1.617.2 (Delta) variant, has been shown to impact vaccine effectiveness against symptomatic infection, especially for individuals who have only had one dose of vaccine.[7]

In Sri Lanka, we had a huge spread of infection and there were a large number of oxygen-dependent patients due to the spread of delta variants throughout the country. Even patients who are vaccinated are admitted to hospital due to illness related to COVID-19 disease.

If the vaccine reduces symptomatic infections, it can lead to ignorance of symptoms and carelessness among people. Ultimately it can increase the spread of infection. Therefore, symptoms of COVID-19 infection among vaccinated patients and the severity of these symptoms must be explored. However, up to now, there are no studies available in Sri Lanka regarding post-vaccination COVID-19 infection. Therefore this study aimed to assess the symptomatic infection among patients who have at least received the first dose of vaccination.

Methodology

We conducted a population-based descriptive type of observational study. A total of 349 symptomatic COVID-19 patients admitted to teaching hospital Jaffna who had taken at least one dose of COVID-19 vaccine were recruited to the study from December 2021 to March 2022. An interviewer-administered questionnaire was used to get the information from the participants. To decide the severity of infection and complications a data sheet was used. This was filled by checking the bedhead ticket. Data were entered into an Excel data sheet and descriptive statistics and chi-square tests were analyzed using Statistical Package for Social Sciences (SPSS) version 21.

Results

There were 349 symptomatic test-positive participants admitted to Teaching Hospital, Jaffna enrolled in the study. These participants were from all the MOH areas from Jaffna but the majority of participants were from the Jaffna MOH area.

In the study, we have analyzed the preexisting medical comorbidities of the symptomatic COVID-19 patients. In that analysis, 212 participants had at least a single comorbidity and 137 participants didn't have any comorbidity. The majority of participants had Diabetes mellitus and hypertension.

In our study, 172 participants (49.28%) were fully vaccinated and among them, 23 had their 3rd booster dose as well, rest of the 144 participants were partially vaccinated, among them, 41 had received both doses but received their 2nd dose less than 14 days of infection and another 103 only received one dose of vaccine but they developed the illness after 14 days of vaccination. 33 participants were under the category of 'Not protected from the vaccine' since they had not completed 14 days following the 1st dose of vaccine.

The commonest symptoms associated with illness were fever, cough and shortness of breath, which accounts for 75.4%, 61.9% and 37.8%. The other symptoms such as sore throat (17.2%) and diarrhea (13.2%) also were present in a number of participants. There were 78 patients who presented with fever with cough and 35 participants presented with fever, cough and shortness of breath.

In our study around 200 (57.3%) participants did not develop any other complications. There were 78(22.4%) participants who developed secondary bacterial pneumonia and 69 (19.8%) participants developed acute kidney injury. Another 78(22.4%) participants developed hepatic impairment and cardiac and CNS involvement were less in number. Complications the participants developed during the illness *are* demonstrated below (*Table 1*).

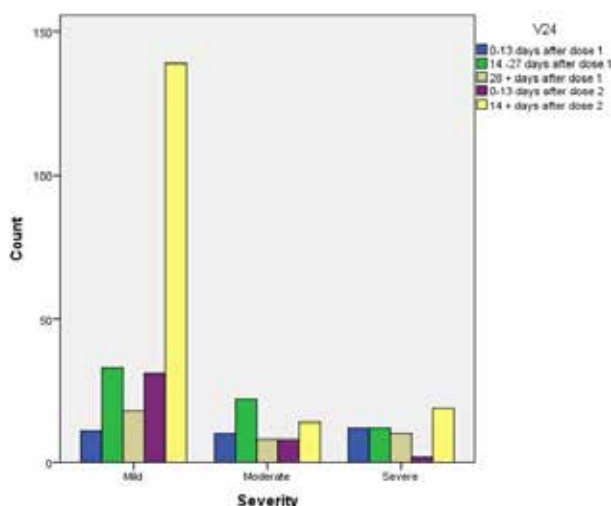
Table 1: Number of complications the participants developed during the illness

No complications	200 (57.3%)
Secondary bacterial pneumonia	29 (8.3%)
Acute kidney injury	23 (6.6%)
Cardiac problems	1 (0.3%)
Hepatic impairment	30 (8.6%)
CNS involvement	1 (0.3%)
Secondary bacterial pneumonia + Acute kidney injury	13 (3.7%)
Secondary bacterial pneumonia + Acute kidney injury + Cardiac problems	2 (0.6%)
Secondary bacterial pneumonia + Acute kidney injury + Hepatic impairment	15 (4.3%)
Secondary bacterial pneumonia + Cardiac problems	2 (0.6%)
Secondary bacterial pneumonia + Hepatic impairment	17 (4.9%)
Acute kidney injury + Hepatic impairment	16 (4.6%)

The association between severity of illness with the duration and dose of vaccination is demonstrated below (*Figure 1*). This analysis shows reduction in severity with the duration of vaccination. According to the Chi square test, the participants those who had completed the 2nd dose of vaccine had less severity of illness. analyzed the duration of vaccination with the severity of the disease.

Figure 1 : Association between severity of illness with the duration and dose of vaccination

Severity	1st dose	1st and 2nd dose	Chi square p value
Mild	57	175	0.0001
Moderate	39	23	
Severe	32	23	



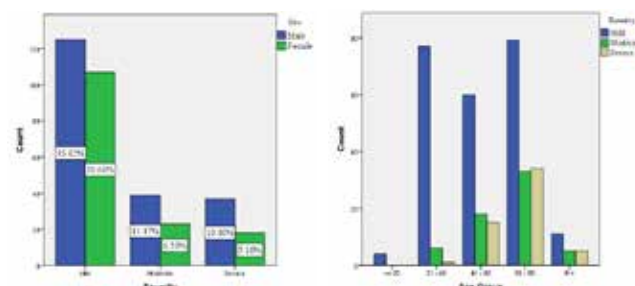
The association between the severity of illness with the type of vaccination demonstrated below (*Table 3*). According to Fisher's Exact test all four types of vaccine are effective in reducing the severity. At the same time sinopharm which includes all categories of patients shows more mild symptomatic patients that show the effectiveness of vaccines in reducing the severity.

Table 2 : Association between the severity of illness with the type of vaccination

Severity	AstraZeneca	Sinopharm	Pfizer	Moderna	Fisher's Exact Test P value
Mild	39	190	3	0	0.0014
Moderate	2	59	0	1	
Severe	2	53	0	0	
Total	43	302	3	1	

The association between the severity of illness and age and gender is demonstrated below (*Figure 2*).

Figure 2: Association between the severity of illness and age and gender



In the study, we have analyzed the number of comorbidities with the severity of disease. This shows with an increased number of comorbidities there is an increase in the severity of the disease. The association between the number of comorbidities with the severity of illness demonstrated below (*Table 4*).

Table 4 : Association between the number of comorbidities with the severity of illness

	Mild	Moderate	Severe	P value
No comorbidity	112	12	11	0.010
One comorbidity	37	11	10	
Two comorbidities	39	12	12	
Three comorbidities	31	16	17	
Four or more comorbidities	13	7	9	

Discussion

In our study most symptomatic COVID-19 participants at least had a single medical comorbidity which accounted for 60.7% and 39.3% didn't have any medical comorbidity. In those comorbidities, most of the participants had Diabetes mellitus and hypertension which account for 42.7% and 38.4% respectively. Among them, 16.1% had a single medical condition and 44.7% had multiple medical conditions. A significant number of participants had other comorbidities such as Dyslipidemia, Ischemic heart disease, and chronic kidney disease which account for 18.9%, 16%, and 12.9% respectively.

According to our study, those who completed the 2nd dose of the vaccine had less severity. Out of 232 participants who have developed mild disease, 175 participants (75.4%) have taken both doses and 57 (24.6%) have taken only the first dose. Of 62 participants who had developed the moderate disease 23 (37%) had taken both doses and 39(63%) had only taken the first dose. The number of participants who had developed severe diseases is 55. Among them, 23 (41.8%) took both doses, and 32 patients took only one dose. This shows the participants who have taken both doses had a less severe illness which was demonstrated by Chi-square test. In our study, 23 participants had their 3rd booster dose, in those participants all of them had mild disease and none of them had ICU admissions.

We compared the duration of vaccination with the severity of illness, participants who had taken only 1 dose and developed symptoms within 0 to 13 days had mild disease in 11(33.3%) participants, moderate disease in 10(30.3%), and severe disease in 12(36.4%) participants. Participants who had taken only 1 dose and developed symptoms after 14 days had mild disease in 51(49.5%) participants, moderate disease in 28(27.2%) and severe disease in 24(23.3%) participants who had taken both doses and developed symptoms, had mild disease in 170(79.8%) participants, moderate disease in 20(9.4%) and severe disease in 23(10.8%) participants. This shows a reduction in severity with the duration of vaccination.

Most of the participants had the Sinopharm vaccine which accounts for 302 participants and another 43 participants had the Astra Zeneca vaccine. In those who had taken the Sinopharm vaccine, the majority of participants (62.91%) had developed only mild symptoms another 19.5% of participants developed moderate symptoms and 17.6% of participants developed severe symptoms. 43 participants had taken the Astra Zeneca vaccine and 90.7% of participants developed mild symptoms, 4.7% developed moderate symptoms and 4.7% of participants developed severe symptoms. This shows these vaccines are quite effective in reducing the severity of the illness.

In our study, we have compared the number of comorbidities with the severity of illness. Of those who did not have any comorbidities, 112(82.2%) had mild disease, 12 (8.9%) had moderate disease and 11 (8.1%) had severe disease. Of those who had one comorbidity 37 (63.8%) had mild disease, 11 (19%) had moderate disease and 10 (17.2%) had severe disease. Of those who had two comorbidities 39 (61.9%) had mild disease, 12 (19%) had moderate disease and 12 (19%) had severe disease. Of those who had three comorbidities 31 (48.4%) had mild disease, 16 (25%) had moderate disease and 17 (26.6%) had severe disease. Of those who had more than four comorbidities, 13 (44.8%) had mild disease, 7 (24.1%) had moderate disease and 9 (31%) had severe disease. This shows with an increased number of comorbidities there is an increase in the severity of infections.

Almost all of these patients had multiple comorbidities and especially 9 patients had chronic kidney disease and transplant recipients who were on multiple immunosuppressive. This shows that chronic kidney disease and immunosuppressive therapy, increase the severity of illness and cause more deaths.

Conclusion

In the study the patients who have taken both doses had less severe illness and there was a reduction in severity with the duration of vaccination. The vaccines were effective in reducing the severity of the illness. There was no association between the severity of the disease

and gender. Our study has demonstrated a significant increase in the severity of illness and death with the increasing age and increasing number of comorbidities.

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