

# Outcome of COVID-19 Infection in Vaccinated Patients in Kirkuk City

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## Abstract

At 2019 an epidemic of viral infection was declared by the WHO, and the virus causing this epidemic was identified and known as (SARS-CoV-2) severe acute respiratory syndrome coronavirus 2. To assess the outcome and severity of infection with COVID-19 virus after been vaccinated with different types of Covid-19 vaccines through various clinical and lab investigations. One thousand patients infected with covid-19 was collected from Azadi teaching hospital and Shifa-14 hospital at Kirkuk city; from 1<sup>st</sup> August to 31<sup>st</sup> January 2022, all of them were vaccinated by two doses, 400 patients with Sinopharm vaccine, 400 with Pfizer–BioNTech vaccine and 200 with AstraZeneca vaccine. Laboratory investigations like CBC, CRP, serum ferritin, serum LDH and d-dimer, chest CT were done for the symptomatic patients to assess their severity. The study found that from 400 COVID-19 patients who were vaccinated with two doses of Sinopharm vaccine, 200 patients had just mild symptoms, 125 had moderate symptoms, 75 patients complained from severe symptoms requiring hospital admission and 10 of them had passed. 400 patients were vaccinated with two doses of Pfizer vaccine, 300 patients had just mild symptoms, 70 patients moderate and 30 patients complained from severe illness required hospital admission and 3 patients passed. 200 patients were vaccinated with two doses of AstraZeneca vaccine, 120 patients had just mild symptoms, 60 patients moderate and 20 patients complained from severe illness required hospital admission and 5 patients passed. It was concluded that majority of vaccinated individuals suffered just from mild symptoms.

The Aim of the study is to assess the outcome of COVID-19 infection in vaccinated patients (Sinopharm, AstraZeneca, and Biotech-Pfizer vaccine) in Kirkuk city, the mortality, mild, moderate and severe cases.

**Keywords:** Covid-19; Sinopharm vaccine; AstraZeneca vaccine; Pfizer–BioNTech vaccine; Kirkuk; Hospital admission; Chest CT.

## 1. Introduction

In 2019 an epidemic of viral infection was declared by the WHO, and the virus causing this epidemic was identified and nominated as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), and the clinical presentations that occur due to infection by this virus are called coronavirus disease 2019 (COVID-19), started at China then became a world wide problem and World Health Organization (WHO) has declared the COVID-19 outbreak as a pandemic in March 2020 [1]. The signs and symptoms of COVID-19 can appear from 2 to 14 days after exposure to an infected person. The time after exposure to the infected patient but before having the signs and symptoms is called the incubation period; the patient is infectious and can spread COVID-19 even before he has symptoms (called pre-symptomatic transmission) [2]. The commonest signs and symptoms that can occur are fever, cough, tiredness, loss of smell or taste, fever, sore throat, difficulty breathing or shortness of breath, headache, and sometimes GIT symptoms, like vomiting, diarrhea, and abdominal pain. The severity of the signs and symptoms of COVID-19 varies from mild to severe, some patients may have only mild symptoms, like mild fever and sore throat, others having much more severe disease and complain of pneumonia symptoms and a drop in oxygen saturation that might require hospital admission and even death [3]. Kirkuk city in Iraq has suffered so much from COVID-19, thousands of people were infected, a lot of them suffered life-threatening symptoms with hospital

admission, a new hospital instructed for the isolation and treatment of severe COVID-19 cases named, Shifa 14 hospital. In March 2021 people in Kirkuk city started taking the Sinopharm vaccine, a month after that AstraZeneca vaccine arrived and vaccination commenced, a month later Pfizer vaccine arrived and the vaccination program by all the three vaccines started. Sinopharm BIBP COVID-19 vaccine is manufactured by inactivating virus COVID-19 vaccine, developed by Sinopharm's Beijing Institute of Biological Products, the vaccine stimulates the immune system for the production of immunoglobulin against the spikes that present at the outer surface of the virus with an efficacy of about 79% after the second dose [4-6]. Oxford–AstraZeneca COVID-19 vaccine is a viral vector vaccine for the prevention of COVID-19, developed in the UK by AstraZeneca which is a British-Swedish Company, and Oxford University, using as a vector which is modified chimpanzee adenovirus ChAdOx1 with an efficacy of about 92% after the second dose. Pfizer–BioNTech COVID-19 vaccine is an mRNA vaccine developed by the German biotechnology company BioNTech in collaboration with American company Pfizer and it is about 95% effective. All three vaccines are authorized to be used against COVID-19 by the ministry of health in Iraq. Studies showed that vaccination could decrease the severity of COVID-19 and significantly reduce mortality; in Kirkuk city, about 30% of people are vaccinated, this study shows the outcome of COVID-19 infection in vaccinated patients. Severe cases of COVID-19 are seen in patients vaccinated by the two doses of

different types, and these cases seem to appear more commonly now with the delta variant that is spreading widely all over countries, and the immunoglobulins in the vaccinated patients are waning over many months ago [7]. All the three available coronavirus vaccines are highly effective in preventing severe forms of COVID-19 infection, but they cannot give 100% effectiveness in preventing infection. Breakthrough COVID-19 can be caused by the delta variant, which is much more infectious than some other coronavirus variants [7, 8].

The aim of this study is to assess the severity of COVID-19 infection after receiving different types of Covid-19 vaccines through various clinical and laboratory investigations.

## 2. Materials and methods

The study included 1000 patients infected with corona (as proved by PCR test) was collected from Azadi teaching hospital and Shifa-14 hospital at Kirkuk city; from 1st August to 31st January 2022, all of them were vaccinated in two doses, 400 patients with Sinopharm vaccine, 400 with Pfizer–BioNTech vaccine and 200 with AstraZeneca vaccine. Laboratory investigations like CBC, CRP, serum ferritin, serum LDH, d-dimer, and chest CT were done for the symptomatic patients to assess their severity. Oxygen saturation is a simple test done for all the patients to detect any drop in SpO<sub>2</sub>. Corona cases are categorized as mild for those who have any of the signs and symptoms of COVID-19 (cough, sore throat, fever, muscle pain, malaise, nausea, headache, diarrhea, vomiting, loss of smell and taste) but without dyspnea, shortness of breath, or chest involvement on CT imaging. Moderate illness for those patients who have clear evidence of lower respiratory tract involvement during clinical assessment or CT imaging and those with oxygen saturation (SpO<sub>2</sub>) ≥94% on room air. Severe illness is patients with SpO<sub>2</sub> <94% on room air, respiratory rate >30 breaths/min, or lung infiltrates >50% on chest CT imaging. Regarding statistical measures, the Chi-square test was used to examine significant statistical associations between variables, and the level of significance was set as P value < 0.05.

## 3. Results

The study found that 400 COVID-19 patients were vaccinated with two doses of Sinopharm vaccine, 400 Pfizer–BioNTech and 200 AstraZeneca (Table 1), 200 patients had just mild symptoms, 125 had moderate symptoms, 75 patients complained of severe symptoms requiring hospital admission and 10 of them had passed.

Vaccine	No.
Sinopharm	400
Pfizer–BioNTech	400
AstraZeneca	200
Total	1000

The study found that from 400 COVID-19 patients who were vaccinated with two doses of Sinopharm vaccine, 200 patients had just mild symptoms, 125 had moderate symptoms, 75 patients complained of severe symptoms requiring hospital admission and 10 of them had passed. Of 400 patients who

were vaccinated with two doses of Pfizer vaccine, 300 patients had just mild symptoms, 70 patients had moderate and 30 patients complained of severe illness required hospital admission 3 patients passed and 200 patients were vaccinated with two doses of AstraZeneca vaccine, 120 patients had just mild symptoms, 60 patients moderate and 20 patients complained from severe illness required hospital admission and 5 patients passed. As shown in Table 2.

Vaccine	Mild illness		Moderate illness		Severe illness		Death		Total
	NO.	%	NO.	%	NO.	%	NO.	%	
Sino pharm	200	50	125	31.25	65	16.25	10	2.5	400
Pfizer	303	75	67	16.75	29	7.25	1	0.25	400
AstraZeneca	151	75.5	31	15.5	12	6	6	3	200
Total	650	65	230	23	120	12	17	1.7	1000

The study indicated that Elderly patients have the majority of clinical features of vaccination in the three different types of Covid-19 vaccines, Table 3,4,5.

Age group	Mild illness		Moderate illness		Severe illness		Death		Total
	NO.	%	NO.	%	NO.	%	NO.	%	
Young	135	92.5	10	6.8	1	0.7	0	0	146
Middle	31	38.2	42	51.8	8	9.9	0	0	81
Old	34	19.7	73	42.2	56	32.4	10	0.6	173
Total	200	50	125	31.3	65	65.2	10	2.5	400

Age group	Mild illness		Moderate illness		Severe illness		Death		Total
	NO.	%	NO.	%	NO.	%	NO.	%	
Young	164	98.2	2	1.2	1	0.6	0	0	167
Middle	76	80.8	14	14.9	4	4.3	0	0	94
Old	63	45.3	51	36.7	24	17.3	1	0.7	139
Total	303	75.5	67	16.8	29	7.3	1	0.25	400

Age group	Mild illness		Moderate illness		Severe illness		Death		Total
	NO.	%	NO.	%	NO.	%	NO.	%	
Young	127	97.7	2	1.5	1	1.8	0	0	130
Middle	19	59.4	9	28.1	4	12.5	0	0	32
Old	5	13.15	20	52.6	7	18.4	6	15.8	38
Total	151	75.5	31	15.5	12	6	6	3	200

## 4. Discussion

In this study, we found that the patient who is vaccinated with Sinopharm of 400 patients 200 (50%) of them complaining from mild illness, 125 (31.25%) of them complaining from moderate illness and 65 (16.25%) of them complaining from severe illness and 10 (2.5%) patients died due to COVID -19. While patients who is vaccinated with Pfizer of 400 patients 303 (75 %) of them complaining from mild illness, 67 (16.75%) of them complaining from moderate illness and 29 (7.25%) of them complaining from severe illness and only 1 (0.25%) patient died due to COVID -19. While patients who is vaccinated with AstraZeneca of 200 patients 151 (75.5 %) of them complaining from mild illness, 31 (15.5%) of them

complaining from moderate illness and 12 (6 %) of them complaining from severe illness and 6 (3 %) patients died due to COVID -19. From this table, we know that the mortality rate is highest in AstraZeneca at 3% and in Sinopharm at 2.5% and lowest in Pfizer at 0.25%, and also severity of the disease is highest in Sinopharm and lowest in Pfizer.

A similar phenomenon has been observed in other viral diseases following infection of vaccinated individuals, such as measles, respiratory syncytial virus (RSV), and dengue virus [9]. Despite the fact that the vaccine is available to the Iraqi population, there is a wide range in people's willingness to accept the vaccine [10]. This reaction of the people can be explained as these vaccines were produced in a short period of time compared to the previously approved vaccines, which typically take many years before their approval. Another possible explanation for this variation is the use of a newly emerging technique for some of the COVID-19 vaccines, mRNA vaccines [10, 11], which has been used for some of the COVID-19 vaccines. In some cases, these two major factors may cause individuals to express concern about the possibility of severe post-vaccination side effects, despite the fact that several reports describing the possible side effects have recently been published.

All of these findings are highly consistent with the results of phase III clinical trials and the fact sheets for the vaccines [9, 12], and the majority of them are reported for those who received the second dose of the vaccine. According to Menni and his colleagues [13], similar findings were reported in a recent study conducted by them. According to the findings of this study, tenderness and local pain around the injection site were the most frequently reported side effects, and they occurred the same day as the injection and lasted for approximately one day. Furthermore, in a study conducted on participants who received Pfizer-BioNTech in Iraq, it was discovered that 70 percent to 80 percent of the study participants had reported pain at the site of the injection [18], which was consistent with previous findings. In contrast to other studies, the majority of participants in our study reported feeling tired and having a headache, which can be partly explained by the fact that our participants were younger in age (median age of 26 years) when compared to the findings of other studies [13, 14]. As has also been demonstrated in a number of studies, younger individuals reported a higher frequency of side effects when compared to older individuals [12, 15]. Both age and gender were not significantly associated with side effects because of the same reason, i.e., the participants were of a younger age group. To give an example, in the Menni et al. [5] study, the participants had an average age of 50 years, with the majority of them being older than 55 years. They reported much less frequency of tiredness, ranging from 8 percent to 21% of those who participated, and women reported more frequent side effects than men [14]. Individuals who received the Oxford-AstraZeneca vaccine were more liable to experience systemic side effects, such as fever, muscle ache and fatigue, when compared to those who received the Pfizer-BioNTech vaccine, according to previous research [16].

## 5. Conclusion

It was concluded that the majority of vaccinated individuals suffered just from mild symptoms. The incidence, severity, and mortality of COVID-19 were less in those who were vaccinated. The best protective vaccine was Pfizer then AstraZeneca and finally Sinopharm, according to the severity of the infected patients.

Recommendation: to establish Covid-19 vaccination to all young, adults and elderly especially those with low immunity.

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