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## Assessment of Vaccine Effectiveness to Reduce the Spread of the Corona Pandemic in the Holy Province of Karbala 2021



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### ABSTRACT

**Introduction:** Since the pandemic of COVID-19, several vaccines have been tested Post-introduction vaccine effectiveness evaluations can help us to understand the vaccine's effect on reducing infection and disease when used in real-world conditions Many factors impact real-life vaccine effectiveness, including vaccine transportation and storage, as well as how patients are vaccinated, dosing intervals. **Objectives:** the study aims to Evaluate the efficiency of vaccines in reducing the spread of the Corona pandemic in the Karbala governorate and preventing the occurrence of critical cases. **Method:** This A test- negative design study (type of case-control study) included 1000 persons aged 18 years and above and was carried out in some hospitals and health centers in the holy Karbala city. Which were convenient nonrandomized samples, from the beginning of August to the end of the month 2021. Cases were persons who that test positive; controls were those that tested negative by using reverse-transcription polymerase chain reaction (rRT-PCR) testing. **Results:** The results showed that there was a significant association between vaccination status and infection rate with COVID19 (odds ratio 17.7), and severity of infection. **Conclusion:** Offer vaccination to that old age (aged 65 years and above) in addition to others especially those in clinical risk groups can help in reducing the infection with COVID19 and the severity of the disease.



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## **INTRODUCTION:**

Several vaccinations have been tested since the COVID-19 epidemic.(1) Having equitable access to safe and effective vaccines is vital to stopping the COVID-19 pandemic, so seeing so many vaccines in research and testing is really encouraging.(2)

The effectiveness of a vaccine is a measure of how well it protects people from infection, symptomatic illness, hospitalization, and mortality. The Centers for Disease Control and Prevention (CDC) studies vaccine effectiveness and safety using a variety of ways. (3)

The test-negative design is a type of case-control research in which cases are participants who test positive for a disease after seeking medical help, whereas controls are participants who test negative in the same situation, with each participant's vaccination status documented. (4) Post-introduction vaccine effectiveness studies can assist us in better understanding how vaccination affects infection and illness reduction in real-world settings. (5) A variety of factors influence vaccination effectiveness in real-world situations, including vaccine transportation and storage, as well as how patients are vaccinated and dose intervals. In addition, people recruited to vaccine clinical trials are often young and healthy, and therefore may differ from those who will receive the vaccines. (6)

Evaluating the efficiency of vaccines in reducing the spread of the Corona pandemic in real-world settings is important.

## **AIM OF THE STUDY:**

Assessing the effectiveness of vaccines in stopping the spread of the Corona pandemic in Karbala governorate and preventing critical cases.

## **MATERIALS AND METHODOLOGY:**

In this research, the test-negative design (TND) was used.

This is the most popular method for determining vaccine efficacy and the most practical in most circumstances.

From August 1 to August 31, 2021, a nonrandomized trial was conducted.

It included inpatients in medical wards and intensive care units, as well as outpatients seeking health care and meeting them in hospitals and some health centers in the holy city of Karbala,

who had a set of symptoms/signs (respiratory symptoms such as fever, cough, and shortness of breath, Fatigue, Muscle or body aches, Headache, the new loss of taste or smell, or throat irritation, congestion or runny nose, nausea or vomiting, diarrhea, severe acute respiratory syndrome, and death).

A test-negative design is a type of case-control study in which participants test for the disease after seeking medical attention.

Availability of reliable diagnostic tests in the study population particularly reverses transcription polymerase chain reaction (rRT-PCR) testing with a sensitivity of at least 85 percent and specificity of at least 98 percent. Potential volunteers in the study were given free testing.

Persons who tested positive were called cases, while those who tested negative were called controls.

The study comprised 1000 persons of both sexes aged 18 and up, with pregnant women being excluded.

The data was collected using a questionnaire designed specifically for this purpose, which included (demographic data, symptoms and signs, whether the condition is positive or negative depending on the results of laboratory testing, the individual's vaccination status, and the severity of the sickness).

The study involved eight primary health care centers (PHCCs) (Eastern and Western Abbasia, Hay Al-muathafeen, Al-Abbas, Al-Ghadeer, Al-Tahadi, Al-Naser and Al-Iskan).

Medical City Hospital, Al-Hindiya General Hospital, and Salamtak Center were also included, as was Imam Hussain, peace be upon him.

Before filling out the questionnaire and defining the study's objective, study participants gave their verbal consent.

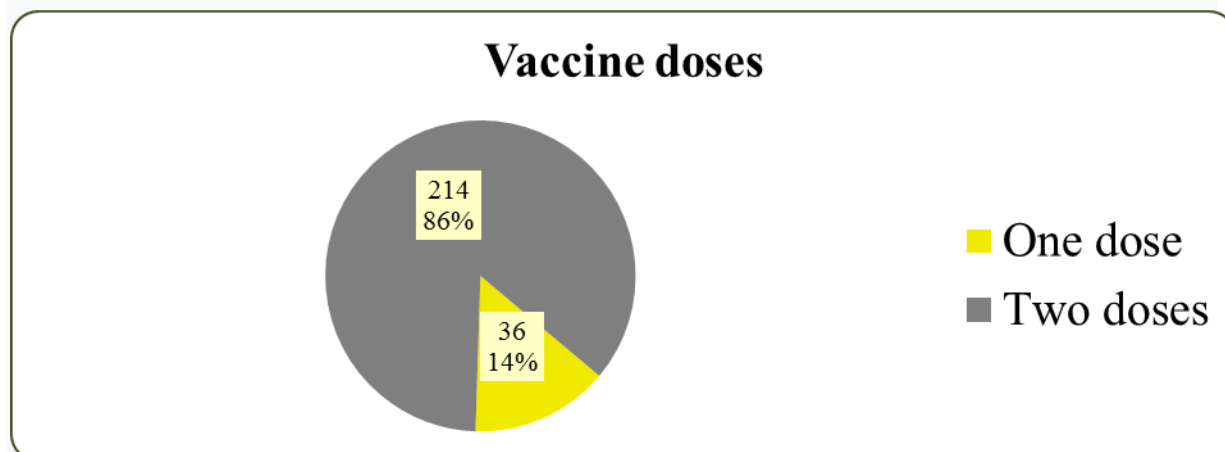
A statistical program was used to collect and analyze the data (SPSS).

## **RESULTS AND DISCUSSION:**

Evaluation of the effectiveness of vaccines helps in understanding how they protect different age groups, persons with specific diseases, hospitalization, and death.

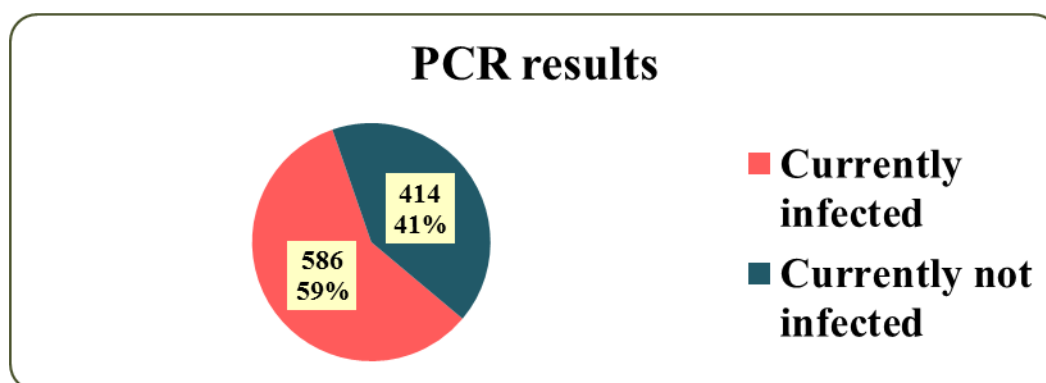
The study showed that the percentage of males who were included in the study (54.6%) is higher than the percentage of females (45.4%).

Only a quarter of those included in the study was vaccinated, and the Pfizer vaccine was one of the most used vaccines by those included in the study. Unvaccinated study group was 750(75%) of the total number.



**Figure 1: Numbers and proportions of the doses of vaccine of the study sample( partial &full vaccination).**

More than three quarters of the vaccinated people included in the study received two doses of the vaccine. 166 (16.6) of the vaccinated persons received Pfizer vaccine, 58(5.8) of them Sino pharm vaccine and 26 (2.6) were received the Astra Zeneca vaccine.



**Figure 2: Numbers and proportions of presence/absence of the disease in the study sample.**

More than half of those included in the study (59%) were infected with COVID-19 .only 34(3.4%) persons from all the study group were vaccinated and diseased (test-positive) and they had mild infection.

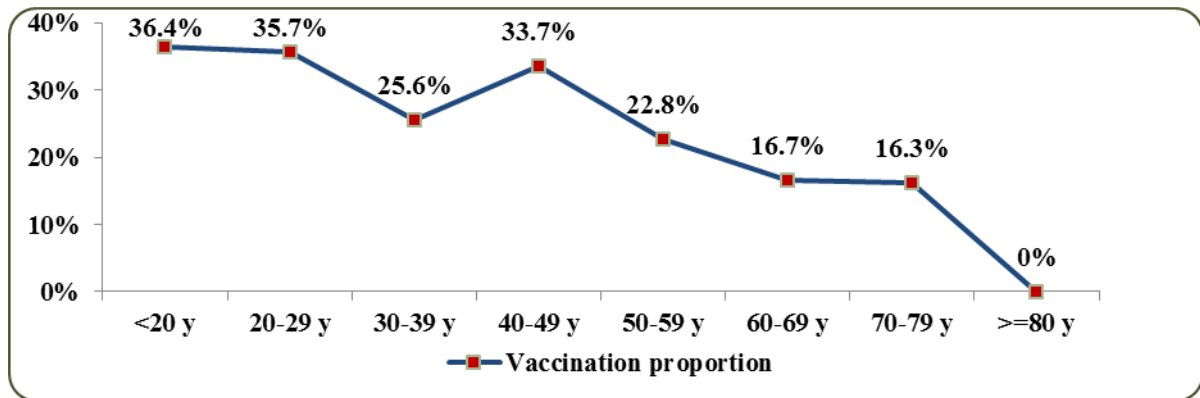


Figure 3: Comparison of vaccination proportions among the age groups of the study sample

As people get older, the number of those who have been vaccinated decreases.

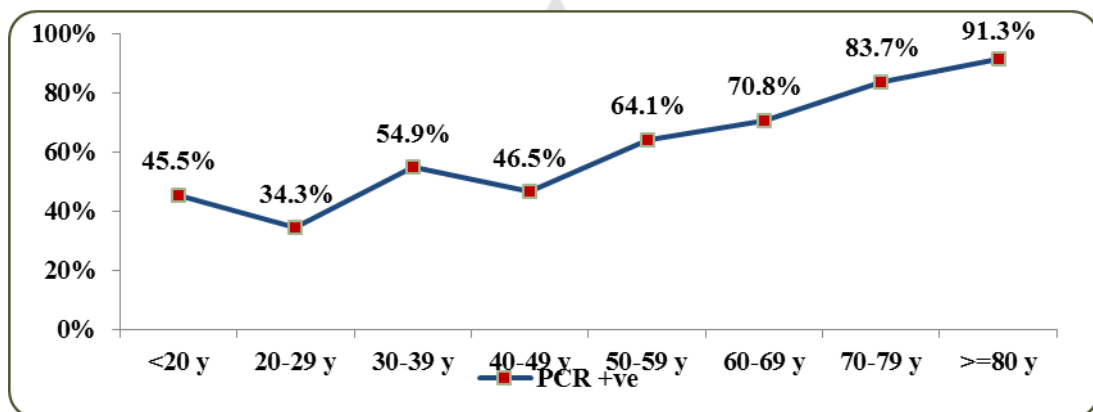
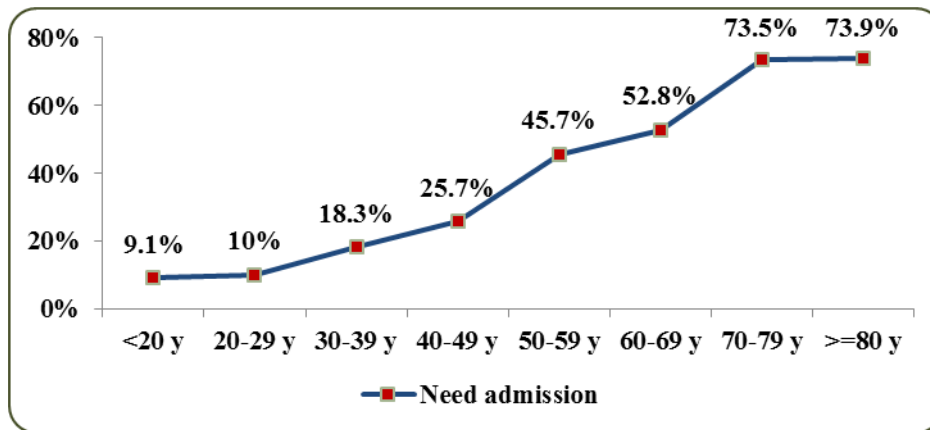


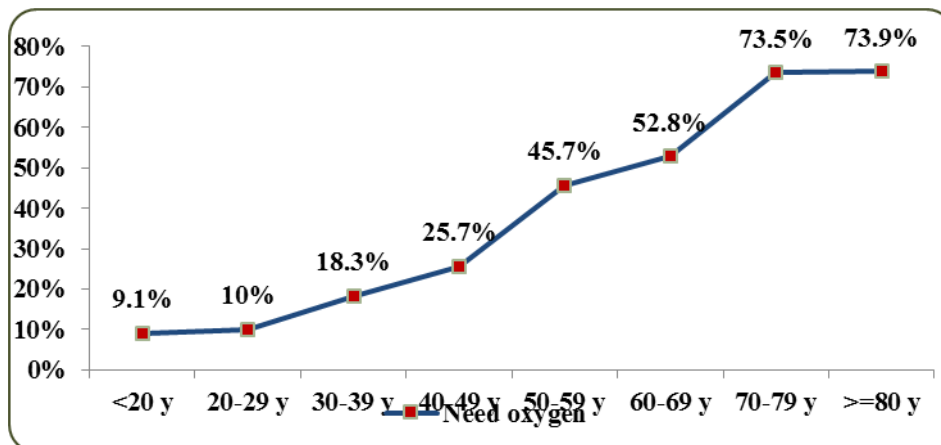
Figure 4: Comparison of PCR +ve patients among the different age groups of the study sample.

The number of infected people (PCR+ve) increases with age in this graph.



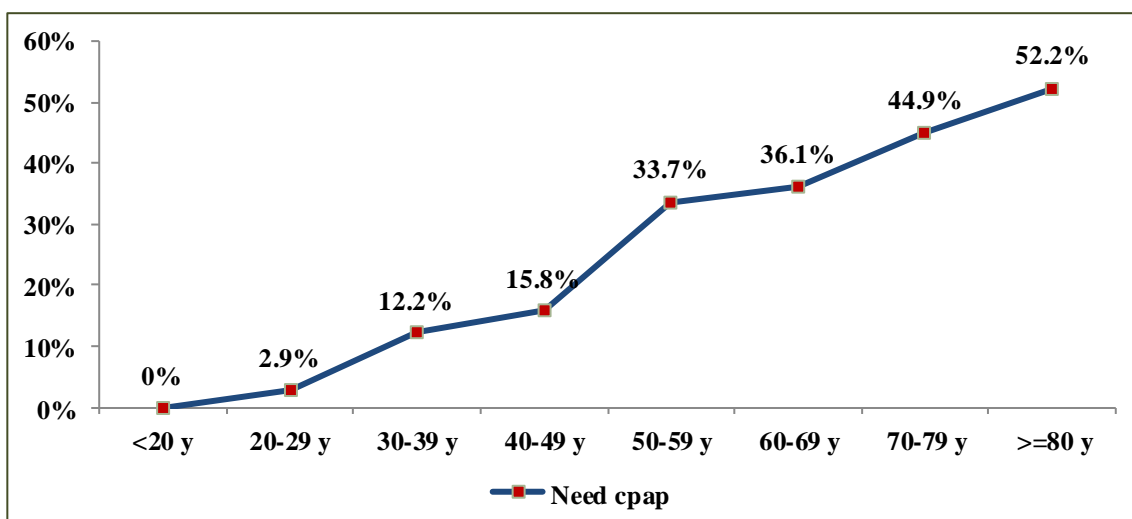
**Figure 5: Comparison of hospitalization proportions among the age groups of the study sample.**

The proportion of hospital admissions increases with age, as shown in this graph. This figure shows the increase in the proportion of hospital admissions with age.



**Figure 6: Comparison of the oxygen needs among the age groups of the study sample**

The demand for oxygen rises with age, as shown in this graph.



**Figure 7: Comparison of the Cpap needs among the age groups of the study sample**

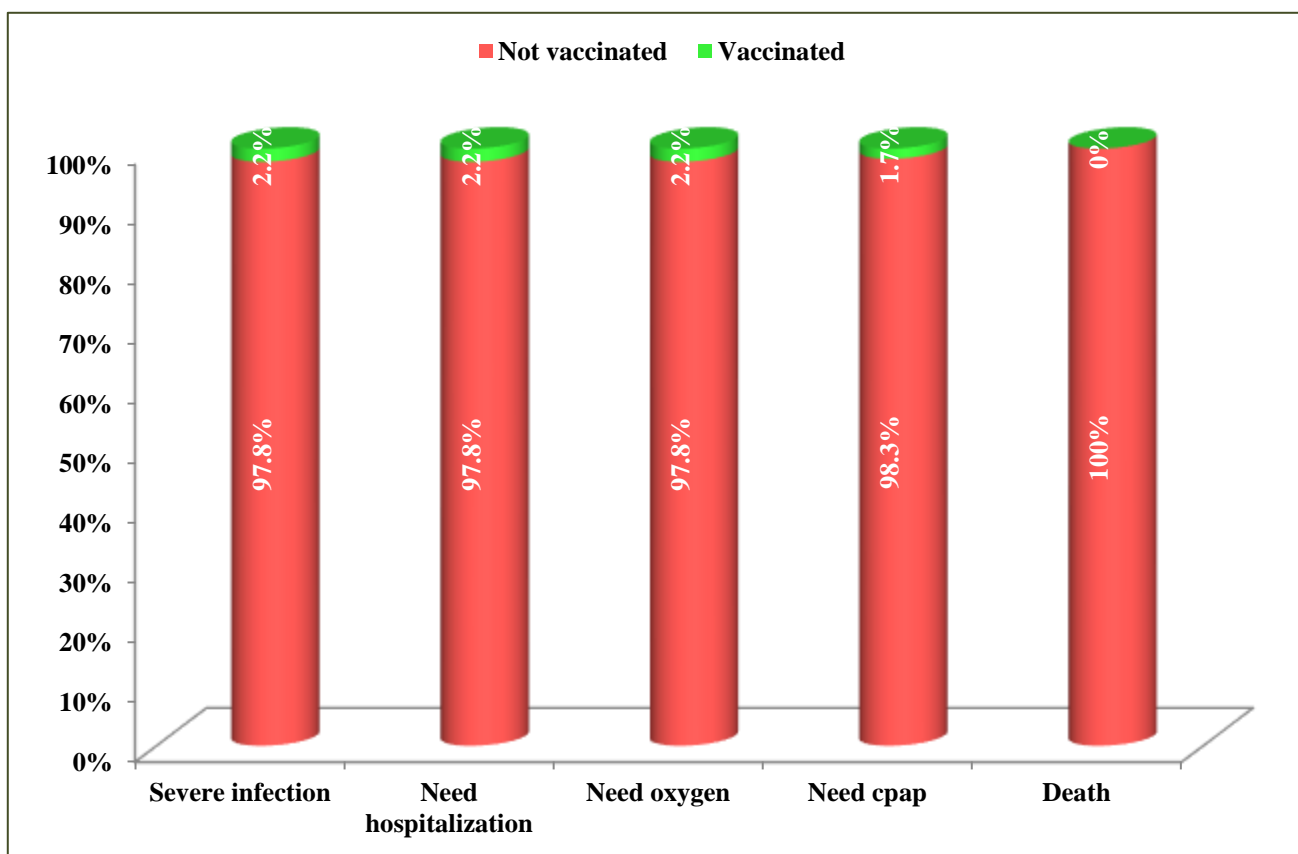
This figure shows the increasing need for Cpap with age.

**Table 1: Association of the vaccination status of the study sample with COVID-19 infection.**

Variables	Categories	PCR Results		Total
		Positive	Negative	
Vaccination status	Not vaccinated	552 (73.6)	198 (26.4)	750 (100)
	Vaccinated	34 (13.6)	216 (86.4)	250 (100)
<b>Total</b>		<b>586 (58.6)</b>	<b>414 (41.4)</b>	<b>1000 (100)</b>

Odds ratio (with 95% Confidence Interval) = 17.7 (11.9-26.3)

This table displays the highest percentage of infected patients in the research who were unvaccinated (73.6%), which had a statistically significant positive result.



**Figure 8: Proportions of the vaccination status of the study patients in relation to the severity of disease and its consequences.**

Figure 8 shows the proportions of study patients' vaccination status with disease severity and effects.

The study found encouraging results about vaccine effectiveness against the disease, as the unvaccinated had the highest rates of infection severity and mortality.

In the trial group, vaccination with one or two doses was related with a considerable reduction in symptomatic covid-19, as well as further protection against severe illness. (figure 8; table 1).

**RECOMMENDATIONS:**

Offer vaccination to that old age (aged 65 years and above) in addition to others especially those in clinical risk groups.



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