



Vaccine Significantly Reduces the Severity of Covid 19 Infection: Evidence from a Community Based Study

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ABSTRACT

Background: Coronavirus disease is an infectious disease caused by newly discovered coronavirus (SARS-CoV-2), which spread rapidly throughout the world. Vaccines will provide a lasting solution by enhancing immunity and containing disease spread. This study was conducted to find out vaccination status among Covid-19 positive patients and correlate severity of infections with vaccination status.

Methodology: This cross sectional study was carried out among 1218 Covid-19 positive patients that were positive after the launch of Covid-19 vaccine, selected by purposive sampling method. Data was collected using pretested semi structured proforma.

Results: Covid-19 vaccination coverage was very low (10.03%) in Covid-19 positive patients, for single dose it was 8.38% and for two doses it was 1.65%. Asymptomatic and mild cases were more in vaccinated compared to unvaccinated, it was statistically significant. Though hospitalization in vaccinated was less it was not significant. There was no death among vaccinated cases.

Conclusion: Vaccination coverage were very low, this needs to improve. Vaccine was significantly reduces the severity of infection. It is recommended to vaccinate all eligible population as early as possible which will help in reducing severe and hospitalized cases and ultimately reducing the impact of Covid-19 pandemic.

Keywords: Coronavirus disease, Covid-19, Vaccine, Hospitalization

INTRODUCTION

Coronavirus disease (COVID-19) is an acute infectious disease caused by a newly discovered coronavirus i.e., SARS-CoV-2, which has spread rapidly throughout the world. In March 2020, the World Health Organization declared COVID-19 outbreak as a pandemic. The pandemic has very severely devastated health systems and economic and social progress globally. While countries, including India, have taken strong measures to prevent the spread of COVID-19 infection through better diagnostics and treatment, vaccines will provide a lasting solution by enhancing immunity and containing the disease

spread. In response to the pandemic, the vaccine development process has been fast-tracked.¹ To reduce the burden of the COVID-19 pandemic in the country, India started the COVID-19 vaccination programme on 16th January 2021 targeting 30 crore beneficiaries based on priority groups identified by NEGVAC.² Based on scientific and epidemiological evidence, the programme gives priority to strengthening the country's healthcare system by protecting the professionals, health care workers and frontline workers, manning it, as well as protecting the most vulnerable population groups. COVID vaccination in the country started with vaccination to all Health Care Workers. The COVID-19 vaccination program was expanded

How to cite this article: Lodha NA, Prajapati B, Joshi H, Dinkar M. Vaccine Significantly Reduces the Severity of Covid 19 Infection: Evidence from a Community Based Study. Natl J Community Med 2022;13(3):195-199. DOI: 10.55489/njcm.1332022399

Financial Support: None declared

Conflict of Interest: None declared

Date of Submission: 13-09-2021

Date of Acceptance: 16-02-2022

Date of Publication: 31-03-2022

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with time to include vaccination of Front Line Workers, citizens more than 60 years of age, citizens more than 45 years of age and eventually citizens more than 18 years of age.³

COVID-19 vaccines are effective and a critical tool to bring the pandemic under control. However, no vaccines are 100% effective in preventing illness. However, there is evidence that COVID-19 vaccination may make illness less severe for those who are vaccinated and still get sick. The risk of infection, hospitalization, and death are all much lower in vaccinated compared to unvaccinated people.⁴ Large-scale clinical studies found that COVID-19 vaccination prevented most people from getting COVID-19. With effectiveness of more than 90 percent, a small percentage of people who are fully vaccinated against COVID-19 will still get sick and some may be hospitalized or die from COVID-19. It's also possible that some fully vaccinated people might have COVID-19 infections, but not have symptoms (asymptomatic infections). It is possible a person could be infected just before or just after COVID-19 vaccination and still get sick. It normally takes about 2 weeks for the body to build protection after vaccination, so a person could get sick if the vaccine has not had enough time to provide protection. Even though a small percentage of fully vaccinated people will get sick from COVID-19 infection, vaccination will protect most people from getting sick. There also is some evidence that COVID-19 vaccination may make illness less severe in people who get vaccinated but still get sick. In spite of this, some fully vaccinated people will still be hospitalized and die. However, the overall risk of hospitalization and death after COVID-19 infection among fully vaccinated people will be much lower than among people with similar risk factors who are not vaccinated. COVID-19 vaccines help and protect people who are vaccinated from getting COVID-19 infection or getting severely ill from COVID-19, including reducing the risk of hospitalization and death.⁵ Present study is an attempt to find out vaccination status among those who are Covid-19 positive, and also compare severity of Covid-19 infections among vaccinated and non-vaccinated persons.

OBJECTIVES

This study was conducted to find out Covid-19 vaccination status among the Covid-19 positive patients and also to correlate the severity of infections among the vaccinated and non-vaccinated Covid-19 positive patients

METHODOLOGY

A descriptive cross sectional study was carried out among the Covid 19 positive cases that were positive after the launch of Covid 19 vaccine in India. We included covid 19 positive cases of last three month reported in Mehsana district starting from date 01-

02-2021 to 15-04-2021. Data of Covid 19 positive cases of above mentioned duration was given by CDHO office, Mehsana district. Total 1218 covid 19 positive cases reported during above mentioned duration as per data from district. We were included all the RTPCR positive or Rapid antigen test positive cases in our study based on Covid 19 case definition.⁶ We were collected required data by telephonic contact of cases, using oral questionnaires method using pretested semi structured proforma. The questionnaire was consisted of three parts, general information of study participants, condition of participants during Covid-19 infection and lastly COVID-19 vaccination status. Experts were consulted for validation. Before starting data collection verbal consent was taken from each study participant and after taking consent we started data collection. Based on information from study participants, we categorized them into asymptomatic cases, mild, moderate and severe diseases.^(6,7)

Operational definitions: Covid 19 positive cases: (A) A person with a positive Nucleic Acid Amplification Test (NAAT) including RT-PCR or any other similar test approved by ICMR. (B) A person with a positive SARS-CoV-2 Antigen-RDT AND meeting either the probable case definition or suspect criteria OR (C) An asymptomatic person with a positive SARS-CoV-2 Antigen-RDT who is a contact of a probable or confirmed case.⁶

Severity of Infection: Mild: Patients with uncomplicated upper respiratory tract infection, may have mild symptoms such as fever, cough, sore throat, nasal congestion, malaise, headache without shortness of breath or Hypoxia (normal saturation)

Moderate: Adults with presence of clinical features of dyspnoea and or hypoxia, fever, cough, including SpO₂ 90 to \leq 93% on room air, Respiratory Rate more or equal to 24 per minute.

Severe: Adults with clinical signs of Pneumonia plus one of the following; respiratory rate >30 breaths/min, severe respiratory distress, SpO₂ <90% on room air.

Type of treatment

Home isolation: it includes those who isolated in home after their positive test and don't take any medicines except multivitamin tablets were categorized as Home isolation.

OPD treatment: Those participants who visited health facility and consulted doctor even for a single time and took symptomatic treatment because of symptoms.

Hospitalized case: Those who admitted in hospital for at least 24 hours during their illness was categorized as Hospitalized cases.

Vaccination status of study participants were confirmed by asking date of vaccination and compare it with data given by district. It was also confirmed by

asking them to share their vaccination certificate if feasible.

Potential risk: There is no risk to participants.

Data Analysis: All statistics will be performed using MS Excel and Epi info. Chi square test will be applied to find association, p-value of < .05 was considered statistically significant.

RESULT

Total 1218 Covid 19 positive cases registered during the study period. All 1218 cases were included in this study. Out of this 1218 study participant, we were able to contact total 907 study participant through telephonic contact. From this 907 patients we elicited information regarding vaccination status, and we found total 91 (10.03%) Covid 19 positive cases having history of Covid 19 vaccination and from these 91 vaccinated patients, 76 (8.38%) cases had taken one dose of vaccine and remaining 15 (1.65%) had taken

two doses of vaccine (Table I). Table II shows the demographic distribution of Covid-19 cases. More than half of the patients (56.22%) were from 21-50 year age group; mean age of patients was 42.57 years. Young age group were more affected as compared to old age group. As the vaccination first launch among frontline worker than in above 60 years of age group and after that among 45 years of age group, maximum vaccinated cases seen in age >60 years of age followed by 51-60 age group, 41-50 age group and 31-40 age group.

Table I. Number of Covid 19 positive cases and their vaccination status

Covid-19 Vaccination Status	Cases (%)
Vaccine received	
One dose	76 (8.38)
Two dose	15 (1.65)
Vaccine not received	816 (89.97)
Total	907 (100)

Table II: Demographic profile of Covid-19 positive cases

Demographic characteristic	Vaccination status		Total (%)	P value	OR (95%CI)
	Vaccinated (n=91) (%)	Not vaccinated (n=816) (%)			
Age group (in years)					
0-10	0 (0.00)	15 (1.84)	15 (1.65)		
11-20	0 (0.00)	61 (7.48)	61 (6.73)		
21-30	5 (5.49)	206 (25.25)	211 (23.26)		
31-40	12 (13.19)	158 (19.36)	170 (18.74)		
41-50	18 (19.78)	111 (13.60)	129 (14.22)		
51-60	21 (23.08)	136 (16.67)	157 (17.31)		
>60	35 (38.46)	129 (15.81)	164 (18.08)		
Mean age	54.82 ± 13.24	41.28 ± 17.71	42.57 ± 17.78	0.0001	
Gender					
Male	61 (67.03)	563 (69.00)	624 (68.80)	0.701	0.91 (0.57-1.44)
Female	30 (32.97)	253 (31.00)	283 (31.20)		
Locality					
Urban	58 (63.74)	504 (61.76)	562 (61.96)	0.713	1.08 (0.69-1.70)
Rural	33 (36.26)	312 (38.24)	345 (38.04)		

Table III: Comparison of vaccination status and severity of infection

Severity of infection	Vaccination status		Total (%)	Odds Ratio	95% CI	P value
	Vaccinated (n=87) (%)	Not vaccinated (n=820) (%)				
Severity of symptoms						
Asymptomatic	11 (12.64)	184 (22.44)	195 (21.50)	1.06	0.35-3.15	0.910
Mild	43 (49.43)	240 (29.27)	283 (31.20)	3.18	1.22-8.30	0.017
Moderate	28 (32.18)	307 (37.44)	335 (36.93)	1.62	0.60-4.32	0.969
Severe (Ref)	5 (5.75)	89 (10.85)	94 (10.36)			
Type of treatment						
Home Isolation	64 (73.56)	624 (76.10)	688 (75.85)	1.76	0.69-4.50	0.235
OPD treatment	18 (20.69)	110 (13.41)	128 (14.11)	2.81	1.00-7.88	0.049
Hospitalization (Ref)	5 (5.75)	86 (10.49)	91 (10.03)			
Duration of symptoms						
Asymptomatic	11 (12.64)	184 (22.44)	195 (21.50)	1.03	0.31-3.34	0.959
0-7 days	38 (43.68)	315 (38.41)	353 (38.92)	2.08	0.71-6.02	0.176
8-14 days	34 (39.08)	252 (30.73)	286 (31.53)	2.32	0.79-6.78	0.121
>14 days (Ref)	4 (4.60)	69 (8.41)	73 (8.05)			
Outcome status						
Recovered	87 (100)	805 (98.18)	892 (98.34)			
Death	0 (0)	15 (1.82)	15 (1.65)			

Male are more affected with Covid 19 infection (68.80%) as compared to female. It was seen that number of vaccinated is more in males but when we compare this numbers with total number of cases among male and female, it was seen that vaccination status was almost equal in Male and female patients. Number of Covid-19 cases was high in urban area as compared to rural area. It was seen that number of vaccinated was high in Urban area as compared to rural area, but when we compare it with total number of cases in both areas, it was seen that vaccination was almost equal in both urban and rural area.

From these 907 cases, we found total 87 (9.59%) Covid 19 positive cases having history of Covid 19 vaccine before present Covid 19 infection and from these 87, 72 (7.93%) cases had taken one dose of vaccine and remaining 15 (1.65%) had taken two doses of vaccine. Remaining 4 Covid 19 positive cases had vaccination after the present Covid 19 infection, so we not included these 4 cases in comparison of vaccination status and severity of present infection among Covid 19 infection. It was seen that 21.50% cases were having no any symptoms and those who had symptoms, most common presenting symptoms were fever (57.22%), followed by Cough and cold (43.66%), Weakness (37.71%), loss of test or smell (18.96%), muscle pain (11.03%) and breathlessness (10.58%). In some cases, we also had seen abdominal pain, nausea and vomiting, anorexia, diarrhoea like git symptoms. Table III shows the comparison between vaccination status and severity of infections. In 87 vaccinated patients, 12.64% were asymptomatic, 81.61% were having mild to moderate symptoms and only 5.75% were having severe symptoms. It was seen that mild symptoms are more in vaccinated group compared to unvaccinated and it was statistically significant. This indicates vaccination has significantly reduced severity of symptoms (OR 3.18, CI 1.22-8.30, P 0.017). When we compare vaccination status and hospitalization after Covid 19 infection, it was seen that only 5.75% cases required hospitalization, 73.56% was home isolated and 20.69% were taken OPD based treatments. It was seen that hospitalization in Covid 19 cases was almost double among non-vaccinated (10.49%) group as compare to vaccinated group (5.75%). This suggests vaccination significantly reduced hospitalization compared to OPD based treatment (OR 2.81, CI 1.00-7.88, P 0.049). The comparison between vaccination status and duration of symptoms shows that patients having symptoms for more than 14 days were more in non-vaccinate group but this difference is statistically not significant. There is total 15 death (1.65%) reported from these 907 Covid 19 positive cases, and all these 15 cases had no history of vaccination (Table III).

DISCUSSION

Vaccines have been used for the prevention of major infectious diseases since decade. Generally a very

long time is required for production of new vaccine but Covid 19 vaccines are produced in a shorter period of time so that people have questions regarding efficacy of vaccine in their mind. The present study was carried out to find out vaccination status among Covid 19 patients and effectiveness of vaccines in reducing severity of infection and hospitalization. The analysis of this data found that 10.03% of the Covid 19 positive cases had history of Covid 19 vaccination and from these, 8.38% cases had taken one dose of vaccine and remaining 1.65% had taken two doses of vaccine. It shows vaccine coverage was very low, similar finding was seen by Patel et al in their study.⁸ More than half of the patients were from 21-50-year age group; mean age of patients was 42.57 years. Male are more affected with Covid 19 infection as compared to female. Similar finding observed by Bhandari et al, the median age 43.5 years and 66.66% were male.⁹ Suri et al in their study found the median age of the patients was 33.5 year, and 58% males.¹⁰

It was seen that one fifth cases were asymptomatic. Mohan et al in their study found, 44.4% patients had no symptoms; among the symptomatic, cough was the most common symptom followed by fever and nasal symptoms.¹¹ In those Covid 19 cases who had taken vaccine, asymptomatic or mild infection were more common, this indicates vaccine was highly effective in reducing the severity of infection (OR 3.18, CI 1.22-8.30, P 0.017). Similar finding was observed by Antonelli et al in their study, symptoms were reported less frequently in infected vaccinated individuals than in infected unvaccinated individuals.¹² This finding is also consistent with other clinical trial efficacy data, which found an efficacy of 76.7% for prevention of moderate to severe disease ≥ 14 days after vaccination.¹³ Analysis shows very few cases were required hospitalization among vaccinated compared to unvaccinated. These findings are consistent with finding of study by Patel et al in which they found vaccination reduces hospitalization.⁸ Some other studies also had similar finding and provide early estimate of the effectiveness in preventing hospitalization.¹⁴⁻¹⁷ Though our study shows vaccination reduced hospitalization, it may be because in our study we found very low vaccination coverage and we had few vaccinated cases as compared to non-vaccinated cases which might affect the result. Vaccination also reduce the duration of symptoms, there were very few cases among vaccinated who had duration more than 14 days, and this finding was consistent with the finding found by Antonelli et al in their study.¹² There is urgent need to improve vaccination coverage with both doses to reduce the severity of infections as well as hospitalization which ultimately reduces the work load for hospital and reduces the impact of pandemics. There was not a single death reported in vaccinated patients. These results are encouraging that if all the eligible are vaccinated, it will help in reducing the mortality and morbidity related to the Covid 19 disease.

LIMITATION

We were not able to contact all Covid 19 cases because either their contact detail was not available or they didn't receive our call, so it was not possible to comment on their vaccination status and outcome of their Covid 19 infection. As we collect data telephonically, it might be possible we miss some clinical information from study participant that lead to bias.

CONCLUSION

From finding of this study we conclude that Vaccination coverage among Covid 19 positive cases are very low, this needs to improve. Vaccine was significantly reduces the severity of Covid 19 infection. Hospitalization in Covid 19 cases was more among non-vaccinated as compare to vaccinated, vaccination was effective in reducing hospitalization. So it is recommended to vaccinate all eligible population as early as possible which will help in reducing severe and hospitalized cases and ultimately it reducing the impact of Covid 19 pandemic.

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