

Recurrence of COVID-19 Infection in Healthcare Workers after complete Vaccination

AQSA NASEER¹, MADEEHA NAZAR², JAMILA KHAN³, HUMERA NASIM⁴, MUJEEB KHAN⁵, NIDA ANJUM⁶, MUHAMMAD UMAR⁷

¹Senior Registrar, Department of Gastroenterology,

^{2,4,6}Senior Registrars, Department of Medicine,

³Senior Registrar, Department of Gastroenterology, POF Hospital, Wah Cantt

⁵Associate Professor, Department of Infectious Diseases, Holy Family Hospital, Rawalpindi

⁷Vice Chancellor, Rawalpindi Medical University, Rawalpindi

Correspondence to Dr. Aqsa Naseer, E-mail: join_aqsa@yahoo.com Cell: 0300-4064369

ABSTRACT

Background: COVID-19 is a novel infection. Since its first case report in 2019, it has affected population globally. Healthcare workers are at most risk as they are in direct contact with patients.

Aim: To record recurrence of symptomatic COVID 19 after complete doses of Sinopharm vaccine among healthcare workers.

Study design: Descriptive case series

Place and duration of study: Department of Gastroenterology, Holy Family Hospital, Rawalpindi from 12th December 2021 to 11th June 2022.

Methodology: Twenty four healthcare workers and between 20-60 years who had COVID-19 infection previously and despite receiving two doses of Sinopharm vaccine, again developed symptomatic COVID-19 diseases were enrolled. The severity was graded as per guidelines provided by CEAG. The extent of exposure during work was documented.

Results: No significant association was found with any of the healthcare workers with duration and extent of vaccination. Upto 66% of the front line workers got COVID at 5th month and no considerable variation was noticed in other months of the vaccination. Similarly, three PGs also got COVID at 5th month and at 5th month highest number of frontline workers got COVID-19.

Conclusion: COVID-19 reinfection can occur even after vaccination though symptoms remain relatively mild and Sinopharm provides protection against severe infection for prevention of COVID-19.

Keywords: COVID, Recurrence, Health workers, Vaccination, Infection

INTRODUCTION

Severe acute respiratory syndrome coronavirus 2 or SARS-CoV-2 emerged as a novel respiratory system infection in Wuhan city, China in 2019 through human-to-human transmission become pandemic.¹ In Pakistan 1st case was reported in February 2020 and since then it has become a major cause of morbidity and mortality. Currently, As of August 16, 2021, the total reported cases globally were 80846181, while total deaths were around 1762319 and in Pakistan total cases were 1,098,410, while total deaths were around 24,406, death rate is 2.2% as per the data released by the Government of Pakistan.

The mild or severe symptoms of SARS-CoV-2 infection vary from patient to patient depending on extent of systemic involvement. The most common symptoms include fever (83%), cough (82%) and shortness of breath (31%). Patients who develop cytokine storm deteriorate rapidly, may require non-invasive and invasive ventilation.² Increase morbidity and mortality researcher communities worldwide to develop vaccine that not only and reduce the chance of transmission but also the severity of disease. Various countries developed their own vaccines with varied efficacy including Pfizer, Moderna, AstraZeneca, Sputnik and Sinopharm. Pakistan used WHO authorized Chinese Sinopharm COVID-19 vaccine for the first³.

Sinopharm is an inactivated vaccine that works on the principal of introducing a dead copy of SARS-CoV-2 into the body through intramuscular injection. Vaccination requires two doses of 14- or 21-days interval and has 79% reported efficacy against the infection.⁴ The dead antigens from SARS-CoV-2 produces the antibodies in the immune system of host to prevent the future viral attacks.³ Commonly reported side effects of Sinopharm vaccine include dizziness, fatigue, headache, nausea, vomiting, fever and allergic dermatitis^{5,6}.

In spite of good efficacy and safety profile of Sinopharm, many completely vaccinated people recorded with symptomatic COVID-19 disease. In a study in Israel conducted by Amit et al⁷,

COVID-19 infection was diagnosed in 22 healthcare workers who had completed scheduled vaccination. However extensive data regarding the development of COVID 19 after complete doses of Sinopharm vaccine is lacking in Pakistan. Therefore, this study was planned to record the recurrence of symptomatic COVID 19 after complete doses of Sinopharm vaccine among healthcare workers of Holy Family Hospital, Rawalpindi. The study group was healthcare workers as they have sound knowledge about this disease.

MATERIALS AND METHODS

This descriptive case series study was conducted in Holy Family Hospital, Rawalpindi. The data was collected through was snowball sampling techniques. The sample population was consisted of healthcare workers (20 to 60 years) who had COVID 19 infection previously and despite receiving two doses of sinopharm vaccine, again developed symptomatic COVID 19 disease. The recurrence of infection was proven through positive PCR report. Those who did not have symptomatic respiratory disease after vaccination were excluded. After taking fully informed consent, history was taken regarding age, gender, job description, symptoms of COVID 19 and severity of illness. The severity was graded as per guidelines provided by CEAG. The extent of exposure during work was documented. The date of 1st and 2nd dose of vaccination and period between vaccination and development of COVID 19 illness was also documented. Number of close family contacts who also developed symptomatic COVID-9 infection along with health care worker was also included. The data was entered and analyzed through SPSS-25. Permission was granted by hospital Ethical Review Board.

RESULTS

There are 16 males and 8 females, different healthcare workers was the part of study. Nine PGT, 4 charge nurse and 3 HO were taken followed by AP, MO and clerk (Table 1). Gender distribution showed that 2 males and 1 female got infection at 6th month of vaccination whereas 3 males and females got COVID-19 within 3

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months. Healthcare workers got infections at different time intervals. No significant association was found with any of healthcare workers with duration and extent of vaccination (Table 2).

Highest number of workers got infection at 5th month of the vaccination. Upto 66% of the front line workers got COVID at 5th month and no considerable variation was noticed in other months of the vaccination (Table 3).

One clerk was present in this study who got infection in first month of the vaccination. Similarly, three PGT also got COVID at 5th month and at 5th month highest number of frontline workers got COVID-19 (Table 4). Fever, fatigability and body aches were the most common symptoms experienced by health workers during 1st episode of recurrence. Likewise, same symptoms were commonly observed in second episode of recurrence. Other symptoms which were frequent other than this was shortness of breath, loss of smell and sore throat (Table 5).

Table 1: Demographic characteristics of the health workers

Variable	No.	%
Gender		
Male	16	
Female	8	
Job Description		
Infection Control Nurse	1	2.1
PGT	9	18.8
HO	3	6.3
WMO	1	2.1
Charge Nurse	4	8.3
AP	2	4.2
MO	1	2.1
PGT MU I	1	2.1
OTA	1	2.1
Clerk	1	2.1

Table 2: Total duration between vaccination and development of Covid-19 in gender and job cadres of health workers

Characteristics	1 Month	2 Month	3 Month	4 Month	5 Months	6 Month
Gender						
Male	3 (75%)	1 (33.3%)	3 (50%)	-	-	2 (66.7%)
Female	1 (25%)	2 (66.7%)	3 (50%)	2 (100%)	6 (100%)	1(33.3%)
Job Description						
Infection Control Nurse	-	-	-	-	1 (16.7%)	-
PGT	2 (50%)	-	1 (16.7%)	1 (50%)	3 (50%)	2 (66.7%)
HO	-	-	2 (33.3%)	-	-	1 (33.3%)
WMO	1 (25%)	-	-	-	-	-
Charge Nurse	-	2 (66.7%)	-	1 (50%)	1 (16.7%)	-
AP	-	1 (33.3%)	1 (16.7%)	-	-	-
MO	-	-	1 (16.7%)	-	-	-
PGT MU I	-	-	-	-	1 (16.7%)	-
OTA	-	-	1 (16.7%)	-	-	-
Clerk	1 (25%)	-	-	-	-	-

Table 3: Total duration between vaccination and development of covid19 in front line worker

Frontline worker	1 Month	2 Month	3 Month	4 Month	5 Months	6 Month
Yes	2 (50%)	2 (66.7%)	2 (33.3%)	2 (100%)	4 (66.7%)	2 (66.7%)
No	2 (50%)	1 (33.3%)	4 (66.7%)	-	2 (33.3%)	1 (33.3%)

Table 4: Total duration between vaccination and development of COVID-19 gender, job description and frontline worker on month wise

Characteristics	1 Month	2 Month	3 Month	4 Month	5 Months	6 Month
Mean age (years)	31	37	35	28	29	28
Gender						
Male	3 (75%)	1 (33.3%)	3 (50%)	-	-	2 (66.7%)
Female	1 (25%)	2 (66.7%)	3 (50%)	2 (100%)	6 (100%)	1 (33.3%)
Job Description						
Infection Control Nurse	-	-	-	-	1 (16.7%)	-
PGT	2 (50%)	-	1 (16.7%)	1 (50%)	3 (50%)	2 (66.7%)
HO	-	-	2 (33.3%)	-	-	1 (33.3%)
WMO	1 (25%)	-	-	-	-	-
Charge Nurse	-	2 (66.7%)	-	1 (50%)	1 (16.7%)	-
AP	-	1 (33.3%)	1 (16.7%)	-	-	-
MO	-	-	1 (16.7%)	-	-	-
PGT MU I	-	-	-	-	1 (16.7%)	-
OTA	-	-	1 (16.7%)	-	-	-
Clerk	1 (25%)	-	-	-	-	-
Frontline worker						
Yes	2 (50%)	2 (66.7%)	2 (33.3%)	2 (100%)	4 (66.7%)	2 (66.7%)
No	2 (50%)	1 (33.3%)	4 (66.7%)	-	2 (33.3%)	1 (33.3%)

Table 5: Symptoms experienced by different health workers in first and second episode recurrence

First episode	N (%)	Second episode	N (%)
Fever-1	21 (%)	Fever-2	24 (%)
Cough-1	17	Cough-2	19
Shortnessofbreath-1	14	Shortnessofbreath-2	9
Diarrhea-1	6	Diarrhea-2	7
Fatigability-1	19	Fatigability-2	20
Lossofsenseofsmell-1	7	Lossofsenseofsmell-2	6
Lossofsenseoftaste-1	10	Loss ofsenseof-taste-2	10
Bodyaches-1	16	Bodyaches-2	16
Palpitations-1	6	Palpitations-2	5
Sorethroat-1	12	Sorethroat-2	11
Nonsevere-1	19	Nonsevere-3	21
Severe-1	6	Severe-3	3
Critical-1	0	Critical-3	1

DISCUSSION

Our study results indicate that reinfection is possible but is not common as was seen in study conducted by Rivelli et al.⁸ In our study, majority were females. This result is similar to a study conducted by Rivelli et al.⁸ and Gohil et al.⁹ This might be due to the fact that female healthcare workers are more compared to males.

Among healthcare workers, post graduate trainees were most commonly reinfected. The results are also similar to study conducted by Rivelli et al.⁸ finding that clinical HCW are affected more than non-clinical healthcare workers. The likely reason is that post graduate trainee doctor deals patients at first end and spent most of their time in hospital settings in close contact with the patients. Moreover, frontline healthcare workers are affected more compared with those working in other specialties. This is due to the fact that they have to visit the COVID wards to see and manage the patients. This management includes not only prescribing treatment but also invasive procedures like inserting CVP lines and endotracheal tubes. These results emphasize the fact that more measures should be taken to protect this highly exposed population to avoid the burden on health system, workload on remaining workers due to absence of affected workers and to reduce the physical and mental impacts of COVID-19 infection. After vaccination, disease was less severe in majority of participants. This result is similar to a study conducted in Israel among healthcare workers¹⁰.

This suggests that at least in some cases, the vaccine protected against severe symptomatic disease but not against getting infection again. Our study had several limitations. Although we had included all healthcare workers who developed reinfection despite of vaccination, sample size in our study was small. Participants in our study were relatively young and healthy individuals, therefore these results should not be applied to elderly population or those with multiple comorbidities and immunosuppression. In addition, we did not check antibodies level in HCW after vaccination. Therefore, the response and effectiveness of vaccine could not be assessed based on antibody levels. In any of the participants, genomic test result was not conducted. Therefore, we are unable to comment on type or variant of the virus.

Further studies should be carried out with large sample size. We suggest multicenter studies to address sample size issue and more advanced tests including genomic testing of virus and specific levels of antibodies to predict the vaccine response and effectiveness. We also suggest that apart from healthcare workers same study should be conducted in general population. In order to protect the exposed population apart from emphasizing on personal protective measures Booster doses of vaccine should be

emphasized but more long-term studies are need to give data on vaccine efficacy, transmission rate and its duration of protection.

CONCLUSION

COVID-19 reinfection can occur even after vaccination though symptoms remain relatively mild. Sinopharm provides protection against severe infection therefore standard measures should be taken for prevention of COVID-19.

Conflict of interest: Nil

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