



# COVID-19 Reinfection or Relapse: Case Series

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One-time reinfection with SARS-Cov-2 does not warranty of immunity against reinfection due to various possible reasons for this like waning immunity or high viral load or an immunocompromised state. Cases of reinfection have been reported from many countries in the world, here in this case series we are sharing the experience of three cases of reinfection from India. Two of them were old with multiple comorbidities and one is a young patient with no comorbidity. All three-patient got reinfected less than two months.

## Introduction

More than a hundred million people have been affected by COVID-19 infection since December 2019 leading to the death of more than two million people [1]. Previous COVID -19 infection does not completely protect people from reinfection and the reasons are not well known. This may be related to short-lasting immunity or inadequate immunological response for appropriate titers of neutralizing antibodies. Hereby we report three cases where the patients have been reinfected with COVID-19 during the first wave of COVID-19 and discuss the potential problems associated with the same.

## Case Reports

### Case one

72-year-old male having symptoms suggestive of COVID-19 tested positive on reverse transcriptase-polymerase chain reaction (RT-PCR) on 18 November 2020. The patient was a known diabetic, hypertensive, and had coronary artery disease (CAD). During COVID infection, he was having moderate symptoms and managed accordingly using intravenous steroids (dexamethasone), remdesivir and other supportive therapies including titrated oxygen therapy (maximum 10l/min). He was subsequently discharged after testing negative by RT-PCR on 8th December 2020. After being discharged home the patient subsequently developed COVID-19 again on 30th December 2020 by a Rapid Antigen Test (RAT). He has been readmitted to the same COVID-19 hospital. The patient was not vaccinated before any of the infections. This time he had initial shortness of breath and fever that subsided within two days of admission and oxygen requirement was confined to supplementation via nasal cannula at 2L/min. The patient was already on dual antiplatelet therapy due to CAD. He also developed uncontrolled sugar levels which were managed with insulin infusion. Pneumonia subsided within 4-5 days and after seven days of admission, a repeat RT-PCR test showed negative. The patient was discharged uneventfully from the hospital.

### Case two

A 50-year-old male who was a known hypertensive and diabetic with a history of ST-elevation MI (CAD) was initially diagnosed with mild SARS-CoV-2 infection on 22 November 2020. He was also a known case of pleural mesothelioma for which he was under treatment (Intravenous Bevacizumab). The infection was managed conservatively and not required any oxygen. He was discharged uneventfully after seven days after testing negative by RT-PCR test. Four weeks later, the patient developed chest pain for which he presented to cardiology clinics. A RAT before admission to the cardiology ward revealed a positive report and the patient was admitted to our COVID-19 hospital. The patient was not vaccinated before any of the infections. The patient was managed medically for chest pain as ECG and Echocardiography did not find any abnormality. He did not have any oxygen requirement and was discharged after seven days on being tested negative by RT-PCR test.

**Case three**

A 31-year-old male patient with no known comorbidity by profession was found COVID-19 on the routine checkup at the airport on 1st October 2020. The patient had no history of fever, cough, or shortness of breath. He was admitted to another hospital and managed with COVID-19 protocol (received multivitamin, vitamin C, povidone-iodine gargle, and tablet paracetamol 500 mg SOS as a part of treatment) and discharged when repeating COVID-19 report (RT-PCR) was negative on 12th October 2020. Again, approximately five weeks later he started developing symptoms like fever, cough, myalgia and was found to test positive along with other members of the family on 20th November 2020. The patient was not vaccinated before any of the two infections. The patient then got admitted to our hospital with mild disease and managed symptomatically and discharged when repeating RT-PCR for SARS-COV-2 came negative on 1st of December 2020. The clinical parameters of all three COVID-19 patients are summarized (Table 1).

	Patient 1		Patient 2		Patient 3	
	Episode 1	Episode 2	Episode 1	Episode 2	Episode 1	Episode 2
COVID-19 severity	Moderate	Mild	mild	mild	Asymptomatic	mild
Symptoms	Fever, Cough, and SOB on routine daily activity, SpO2 less 86-90 on room air	Fever, mild SOB, and SpO2 90-92 on room air	Low-grade fever and mild cough	Asymptomatic	No	Low-grade fever, cough myalgia
Duration of symptoms	14 days	4-5 days	5days	4 days	-	4-5 days
The gap in 1 <sup>st</sup> and 2 <sup>nd</sup> episode	3 weeks		4 weeks		5 weeks	
Treatment drugs	Dexamethasone, Remdesivir, Paracetamol, Multivitamin \Azithromycin and insulin and antiplatelet for management of comorbidities	Paracetamol, Multi-vitamin, asthalin and budicort nebulastion	Paracetamol sos, Cough syrup Multivitamin,	Paracetamol sos, Multivitamin (zincovit)Tab. Vitamin C 1	Paracetamol 500 mg sosMultivitamin (zincovit)Vitamin CPovidine gargle	Paracetamol 500 mg sosMultivitamin (zincovit)Vitamin CPovidine gargle
Oxygen supplementation	Given maximum 10L/min then gradually titrated	Minimal nasal (2-4L/min.	No	No	No	No
Days of recovery	20 days	7days	8days	7 day	12 days	7days

**Table 1. Clinical Parameters of the Three Patients.**

SOB, Shortness of breath

We have noted the severity of infection in all the patients after reinfection and have also included the type of treatment they received.

## Discussion

We reported three patients having COVID-19 infection the second time after a symptom-free interval of 3, 4, and 5 weeks. This could either be explained by a relapse or reinfection. Although no gold standard test for COVID-19 infection has been established for reinfection, the RT-PCR test is highly sensitive and specific [2]. However, it needs to be reiterated that even dead COVID-19 antigen may give a positive result on testing. Hence clinical status needs also to be seen in conjunction when assessing these patients with reinfection. Our cases had a similar clinical adjudication in both their episodes of infection.

There is not much evidence to guarantee that immune response after an initial infection from COVID-19 is sufficient enough to protect from subsequent infections [3]. But it is presumed that if the immune response of the body is not capable of preventing a second infection it should at least stave off severe illness. In all three of our cases, patients were discharged after seven days of detection of a second infection. A similar result was found in cases reported from Israel and UK [4,5].

We believe that the patients were unable to generate an adequate immunity following the first infection or provided only partial immunity. A systematic review published recently identified 31 studies with reports of reinfection [6]. They however concluded that a positive RT-PCR test could be due to several factors and should not always be considered reinfection or relapse of the disease. Since two of our patients were elderly and suffered from multiple comorbidities, an immunosuppressive state may also contribute to relapse or reinfection of the disease. But the third patient was a young male of 31 years old with no known comorbidity which points the needle of suspect towards short-lived immunity or high viral load exposure the second time.

Although there have been several case reports of a second infection of COVID-19 throughout the world, this is the first of its kind in India [7-9]. This report only adds to a growing body of evidence and poses a challenge for public health and vaccination efforts. In consideration of the net protective effect of antibodies, the evidence is still lacking and more research needs to be done in this aspect. In conclusion, one-time infection with COVID-19 doesn't warranty immunity against reinfection due to possible reasons like waning immunity, high viral load, or an immunocompromised state.

## References

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