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Letter to the Editor

LETTER TO THE EDITOR

SARS-CoV-2 infection in chronic kidney disease patients vaccinated with Oxford/AstraZeneca COVID-19 vaccine: initial Indian experience

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Severe acute respiratory distress syndrome coronavirus 2 (SARS-CoV-2) has grossly unsettled all aspects of humanity across the globe. As of May 2021, India is battling with the coronavirus diease 2019 (COVID-19) crisis and topping the world with the highest number of daily cases [1]. Additionally, the burden of chronic kidney disease (CKD) is among the highest in the world and has worsened further in the pandemic [2]. COVID-19-associated mortality has been reported higher in CKD compared with the general population [3, 4]. The vaccination campaign has progressed in the developed world relative to India, which is still up against the herculean task of vaccinating an enormous population amid the COVID-19 surge. Indian advisories, through May 2021, have approved two vaccines, the Oxford–AstraZeneca vaccine (ChAdOx1 nCov-19; Covishield) and BBV152 (Covaxin). The fear of suboptimal antibody response to COVID-19 vaccines in CKD was relieved by recent studies showing adequate immunogenicity of vaccines [5, 6]. However, with various vaccines available across the world and with diverse ethnicity, the antibody response and protection is expected to vary. Herein we report our experience of SARS-CoV-2 in CKD patients admitted in Institute of Kidney Diseases and Research Center, Institute of Transplantation Sciences , Ahmedabad, Gujarat, India, who received either a single or two doses of the Oxford–AstraZeneca COVID-19 vaccine. To the best of our knowledge, this is the first such report.

Overall, during the study period from 3 May 2021 to 10 May 2021, we detected 10 vaccinated CKD patients (6 with two doses and 4 with one dose) who contracted COVID-19 (Table 1). The median age of the case series was 55 years [interquartile range (IQR) 50–64], with the majority being males (70%). Six patients were on maintenance hemodialysis. All of the patients had hypertension as a common comorbidity. The SARS-CoV-2 severity of the eight surviving patients ranged from mild ($n = 3$) to moderate ($n = 1$) to severe ($n = 3$). Most of the laboratory parameters in the study were out of the normal range, except in Patient 4, who was not investigated further and was managed at home. Patients were managed mostly with oxygen support ($n = 7$), anticoagulation ($n = 8$), remdesivir ($n = 7$) and steroids ($n = 5$). Two patients died and eight were discharged. Patient 2 had prior a COVID-19 infection 8 months earlier and had a mild illness in both episodes. The median duration from the last dose of vaccine to the onset of COVID-19 symptoms was 29 days (IQR 23–34). SARS-CoV-2 antibody levels were >40 AU/mL in most cases, except for the two patients who died and were on immunosuppression.

The first noteworthy finding from our report is that the CKD patients on immunosuppression may have an inadequate response with the Oxford–AstraZeneca vaccine, which makes them more prone to acquiring severe COVID-19. The second finding is that CKD patients are still susceptible to COVID-19 even with adequate antibody response. The different strains circulating are possibly responsible for this finding, but due to resource limitations, genomic sequencing was not completed. We suggest continued research in the field of vaccine development and the impact of the vaccine on variants to assess the real-world impacts of the vaccination. The CKD group, even though

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Table 1. Summary of the 10 cases

Characteristics	Patient 1	Patient 2	Patient 3	Patient 4	Patient 5	Patient 6	Patient 7	Patient 8	Patient 9	Patient 10
Demographics										
Age (years)/sex	55/M	55/F	62/M	45/M	54/F	73/F	45/M	46/M	71/M	72/M
Native kidney disease	DKD	DKD	Obstructive uropathy	HTN	Unknown	Unknown	Post-transplant CKD	Post-transplant CKD	Post-transplant CKD	HTN
Baseline drugs	On OHA	On insulin + OHA + CCB + alpha agonist + loop diuretic + aspirin + statin	Carvedilol, ARB, sevelamer	Calcitriol, nifedipine, levetiracetam	Anti-HTN aspirin	Anti-HTN	Steroids	Steroids and antimetabolite	Steroids, antimetabolite, CNI	OHA, anti-HTN
Baseline serum creatinine (mg/dL)	2.5	4.3	HD	HD	HD	AKI on CKD	HD	HD	1.8	HD
Baseline eGFR (mL/min/1.73 m^2)	28	11	<10	<10	<10	<10	<10	<10	34	<10
Dialysis vintage	Conservative	Conservative	2 years	2 years	2 years	Conservative	1 year	1 month	Conservative	3 months
Dialysis access	–	–	AVF	AVF	Permanent catheter	Temporary catheter	AVF	AVF	–	AVF
Comorbidities other than CKD	HTN, diabetes	HTN	HTN, diabetes, LVD	HTN, CVA	CVA/IHD	HTN	HTN	HTN	Diabetes	HTN, diabetes
History of COVID-19 re-infection	No	8 months prior, mild COVID-19; 1 cycle of HD required	No	No	No	No	No	No	No	No
ChAdOx1 nCov-19 vaccine status										
Doses taken	2	1	2	2	1	2	1	1	2	2
Duration from vaccine to onset of COVID-19 symptoms (days)	42	24	19	28	30	32	45	23	23	40
SARS-CoV-2 IgG spike protein antibody levels (CLIA) (AU/mL)	>400	48	105	110	112	138	3.8	4.6	Non-reactive	Not done
SARS-Cov-2 RT-PCR	Positive	Positive	Positive	Positive	Negative[a]	Positive[b]	Positive	Positive	Positive	Positive
Oxygen requirement on admission	NRBM	Ambient air	Low flow oxygen 2 days	Home	Room air	NRBM	Low-flow oxygen	NRBM	NRBM	Ambient air
Anti-COVID-19 therapy	Remdesivir, steroids	Favipiravir	Remdesivir	No	Supportive care	Remdesivir, steroids	Remdesivir, steroids	Remdesivir, steroids	Remdesivir, steroids, CPC	Remdesivir
Presenting complaints	Fever, cough, DOB × 5 days	Cough, fever for 3 days	DOB for 2 days	Fever cough 3 days	DOB for 5 days	DOB for 5 days	DOB for 2 days	Fever, cough, DOB for 1 day	Fever, cough, DOB for 1 day	Fever, cough for 3 days
Hospital course and outcome										
AKI on CKD	Yes (recovered)	Yes (recovered)	–	–	–		–	–	–	–
HD requirement	No	No	MHD	MHD	MHD	HD	MHD	MHD	No	MHD
Highest oxygen requirement	NRBM	Ambient air	Low-flow oxygen	Home	NRBM	NRBM	Low-flow oxygen	Mechanical ventilation	Mechanical ventilation	Ambient air
Outcome	Admitted	Discharged	Discharged	Discharged	Discharged	Discharged	Discharged	Died	Died	Discharged
Radiological abnormalities	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Laboratory abnormalities (worst reported)										
TLC (× 10^3/mm^3)	14.9	6.89	5.3	–	16.2	9.5	3.58	15.9	27	6

(continued)

Table 1. (continued)

Characteristics	Patient 1	Patient 2	Patient 3	Patient 4	Patient 5	Patient 6	Patient 7	Patient 8	Patient 9	Patient 10
Platelets ($\times$ 10^3/mm^3)	292	197	90	–	120	225	102	216	238	89
Neutrophil (%)	89	54	71	–	78	85	75	93	90	90
Lymphocytes (%)	10	42	26	–	20	13	23	5	8	10
ALC ($\times$ 10^3/mm^3)	1.4	2.8	1.3		3.2	1.2	0.8	7.9	2.1	0.6
NLR	8.9	1.2	2.7	–	3.9	6.5	3.2	18.6	11	9
D-dimer (ng/mL)	630	930	1260	–	>4000	1700	2530	1230	–	1720
IL-6 (pg/mL)	19	14.22	30	–	908	–	228	642	1146	154
Ferritin (ng/mL)	Not done	307		–	1420	126	1120	915	1000	1000
Serum creatinine (mg/dL)	2.54	6.05	MHD	MHD	MHD	1.8	MHD	MHD	2.46	MHD
hs-CRP (mg/L)	17.3	3.93	18.7	–	79	70	45	84	81	140
LDH (IU/L)	353	247	203	–	298	272	1733	243	275	253

[a]Clinically suspected.

[b]Outside hospital reported COVID-19 positive.

eGFR, estimated glomerular filtration rate; DKD, diabetic kidney disease; HTN, hypertension; HD, hemodialysis; MHD, maintenance hemodialysis; RT-PCR, reverse transcription polymerase chain reaction; CVA, cerebrovascular accident; CLIA, Clinical Laboratory Improvement Amendments; AKI, acute kidney injury; LVD, left ventricular dysfunction; IHD, ischemic heart disease; DB, difficulty breathing; NRBM, non-rebreather mask; TLC, total leukocyte count; IL-6, interleukin-6; hs-CRP, high-sensitivity C-reactive protein; LDH, lactate dehydrogenase; ; NLR, neutrophil:lymphocyte ratio; ALC, absolute lymphocyte count; OHA, oral hypoglycemic drugs; CCB, calcium channel blocker; CPC, convalescent plasma component.

they mounted a reasonable antibody response, still acquired COVID-19. The protective cut-off antibody level is unknown in different ethnicities, as the immune composition may vary in individuals of various geographic regions, as is the impact of variants [7]. There have been concerning reports of attenuated antibody response to messenger RNA COVID-19 vaccines in organ transplant recipients [8]. Similar to a previous report [9], the three patients who were CKD and post-renal transplant status did not mount antibody response. In conclusion, we report the first study of COVID-19 in CKD patients vaccinated with the Oxford–AstraZeneca vaccine, emphasizing the need for expanded research with various vaccines and variants in this high-risk population.

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CONFLICT OF INTEREST STATEMENT

None declared.

DATA AVAILABILITY STATEMENT

Data will be available from the corresponding author on reasonable request.

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