Prolonged rapid antigen test positivity among COVID-19 patients

Most guidelines recommend a symptom-based strategy to determine the duration of isolation among COVID-19 patients.[1] Antigen tests has been shown to have a higher positive predictive value for viral culture positivity than reverse transcriptase-polymerase chain reaction (RT-PCR) and is therefore likely to be a good tool to determine the duration of infectiousness.[2] Until recently, Government of Kerala guidelines recommended a rapid antigen test- (RAT) based strategy for discharge and duration of isolation in COVID-19 patients.[3] RAT had to be done on the 10th day for mild illness and 14th day for severe illness. If RAT was negative, the patients were fit for discharge and if positive, it was repeated every alternate day till negative (complete guidelines are given in supplementary appendix). These guidelines provided us a unique opportunity to study the duration of antigen positivity in COVID-19 and factors predicting prolonged antigen positivity.

We retrospectively analysed the data of COVID-19 patients (diagnosed by a RT-PCR based test or a RAT) admitted between 1st August 2020 and 30th November 2020, who underwent RAT test for discontinuing isolation. We used the STANDARD Q COVID-19 Ag Test (SD Biosensor, Inc), which is a rapid chromatographic immunoassay for the qualitative detection of specific SARS-CoV-2 antigens.[4] Clinical details of the patients were retrieved from electronic medical records.

We defined prolonged antigen positivity as RAT positivity ≥14 days from the onset of symptoms or from first positive COVID-19 test, whichever earlier. Factors predicting prolonged RAT positivity were assessed by Chi-square test. Variables that were found to be significant ($P < 0.05$) on univariate analysis were included in a multivariate analysis using binary logistical regression to determine independent predictors of prolonged RAT positivity.

Of the 508 patients included in the study, 279 (54.9%) were males. Median age of the patients was 47 years (interquartile range: 33–61). Diabetes mellitus (DM) was the most common comorbidity (34.3%); 12% of the patients received corticosteroids, while remdesivir was used in 11.6%. Supplemental oxygen and invasive mechanical ventilation (IMV) was required in 9.8% and 2.6% patients, respectively. In-hospital mortality was 2.4%. The mean number of days until turning negative by RAT was 12.9 ± 3.1 days [Figure 1]. About 119 patients (23.4%) remained positive ≥14 days. Univariate analysis showed that age ≥65 years, male sex, DM, hypertension, chronic kidney disease, chronic liver disease, remdesivir use, corticosteroid use, requirement for supplemental oxygen, and IMV were significant predictors of RAT positivity ≥14 days [Table 1]. On multivariate analysis, only DM [OR: 2.37 (95% CI: 1.32–4.06, $P = 0.003$)] and requirement of supplemental oxygen [OR: 4.92 (1.07–22.72), $P = 0.040$] were found to be independent predictors of RAT positivity ≥14 days.

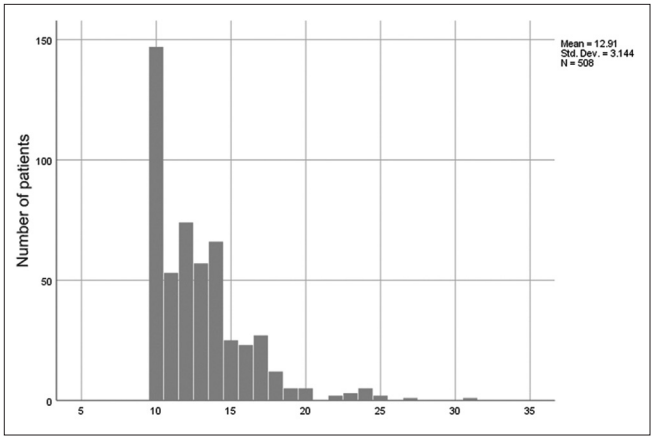

Figure 1: Day of turning negative by rapid antigen test (x-axis shows the days from the first test/onset of symptoms whichever is earlier)

Our study showed that the mean duration for RAT negativity was 12.9 days and in 23.4% patients, it took ≥14 days for RAT negativity. Considering the previous studies that correlate antigen positivity and infectiousness in COVID-19, our observations call for exploring the requirement for a longer duration of isolation, and the role of RAT in deciding the duration of isolation.

Supplementary materials

Classification of COVID-19 patients and discharge guidelines as per Health and Family Welfare Department, Government of Kerala.

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Conflicts of interest

There are no conflicts of interest.

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Table 1: Prolonged antigen positivity among various groups

	Number of patients	Number of patients with antigen positivity ≥14 days (percentage)	Odds ratio	*P*
Age				
≥65 years	93	32 (34.4%)	1.98	0.01
<65 years	415	87 (21.0%)		
Sex				
Male	279	77 (27.6%)	1.7	0.02
Female	229	42 (18.3%)		
Hypertension				
Yes	163	55 (33.7%)	2.24	<0.01
No	345	64 (18.6%)		
DM				
Yes	174	66 (37.9%)	3.24	<0.01
No	334	53 (15.9%)		
CKD				
Yes	33	13 (39.4%)	2.26	0.03
No	475	106 (22.3%)		
CLD				
Yes	8	5 (62.5%)	5.64	0.02
No	500	114 (22.8%)		
Immunosuppressive drugs				
Yes	4	1 (25%)	1.09	0.94
No	504	118 (23.4%)		
COPD				
Yes	3	1 (33.3%)	1.64	0.55
No	505	118 (22.8%)		
Bronchial Asthma				
Yes	25	9 (36.0%)	1.9	0.2
No	483	110 (22.8%)		
Malignancy				
Yes	8	3 (37.5%)	1.98	0.4
No	500	116 (24.2%)		
HCQ				
Yes	30	8 (26.7%)	1.2	0.65
No	478	111 (23.2%)		
Remdesivir				
Yes	59	39 (66.1%)	8.9	<0.01
No	449	80 (17.8%)		
Corticosteroids				
Yes	61	42 (68.9%)	10.62	<0.01
No	447	77 (17.2%)		
O_2 requirement				
Yes	50	37 (74.0%)	13.05	<0.01
No	458	82 (17.9%)		
IMV requirement				
Yes	13	9 (69.2%)	7.87	<0.01
No	110	495 (22.2%)		

DM: Diabetes mellitus, CKD: Chronic kidney diseases, CLD: Chronic liver diseases, COPD: Chronic obstructive pulmonary diseases, HCQ: Hydroxychloroquine, IMV: Invasive mechanical ventilation

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