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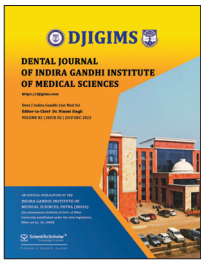

Original Article

Role of Covid-19 Rapid Antigen Test in Dental Patients at Tertiary Health Care Center: A Hospital-based Study

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ABSTRACT

Objectives: COVID-19 pandemic is considered to be highly transmissible disease that can cause severe acute respiratory syndrome (SARS-CoV-2), as dental operatory has a unique environment. Oral surgeons, who are continuously working on mouth-related conditions, are at maximum risk of direct and indirect exposure to these potentially infectious viruses. Therefore, the objective of our study was to evaluate the efficacy of Rapid antigen tests (RATs). RATS are helpful in identifying the viral pathogens and anticipate the need for pathogen testing in the dental operatories.

Material and Methods: A total of 103 subjects were enrolled, who reported to Oral Medicine and Radiology (OMR) and Out Patient Department (OPD) at our institute. All patients who reported to our OPD with and without symptoms were sent for RAT before entering the operatory. Demographic data and symptoms such as cold, cough, fever, and breathlessness were recorded for all subjects.

Results: In our study, the predominant age groups that were affected by COVID-19 were 21–40 and 41–60 years. Males were affected more as compared to females in these age groups. The most common symptoms observed were cold, cough, fever, and breathlessness. The symptom which was of most concern for us was breathlessness; 1.9% subjects had breathlessness, and all were RAT positive.

Conclusion: Unique environment of dental setup possesses a high risk of infection with COVID-19 virus, for both the staff and the patients. RAT delivers immediate, accurate, and appropriate results to dental clinics and their teams, which help to reduce the transmission of disease. It also contributes to the free flow of patients in hospitals.

Keywords: RAT, COVID-19, Polymerase chain reaction, Dental practise, Pandemic

INTRODUCTION

In the beginning of December, the corona virus was first identified in Wuhan, China. This virus caused severe acute respiratory syndrome (SARS) and common cold.[1] On Feb 2020, WHO officially named this as COVID-19.[2] By the direct contact with respiratory droplets of a person suffering from this virus, other person can get infected.[3] Clinical symptoms of COVID-19 may resemble to flu-like symptoms and seasonal allergies.[4] According to the Centre for Disease Control and Prevention, some of the symptoms may include hyperthermia, cough, breathlessness, myalgia, headache, sore throat, altered taste and smell, nasal stuffiness, vomiting, and diarrhea. In patients with underlying medical conditions, the risk of developing serious complications is higher and can be fatal.[5] It has a potential to transmit such infections in enclosed dental environments.[6]

Exposure to these viruses can put the operator at higher risk as these infectious viruses could stay on hands, objects or surfaces for a long time.[7] These viral infections can be diagnosed by culture and various serological techniques. Indian Council of Medical Research (ICMR) has considered Real-time reverse transcriptase-polymerase chain reaction (RT-PCR) as the gold standard diagnostic test for COVID-19 detection, but has its own limitations, such as higher cost, longer turnaround time, issues of sample collection and transportation, and need for specialized laboratory set up. Rapid antigen test (RAT) could be used as an alternative to polymerase chain reaction (PCR) as it is cost-effective, used as point-of-care (POC) test, and could improve the turnaround time for results.[8] Rapid POC tests are an appropriate screening test for dental patients as it provides results within a few minutes, and take rapid decision whether intervention is needed. These methods of investigating COVID-19 virus will be helpful in identifying the viral pathogens in our highly infectious zone.[9] Hence, the aim of our study was to evaluate the efficacy of RAT.

MATERIAL AND METHODS

Study subjects

The approval from the Institutional Ethics Committee (IEC) was taken-approval reference no. 113/IEC/2021/IGMS. Our study was conducted in accordance with the Declaration of Helsinki. For conducting this human observational study, we followed the STROBE GUIDELINES. A total of 103 patients who visited our tertiary healthcare center during the peak of SARS-CoV-2 variants of concern (VOCs) were enrolled in the study. All subjects who reported to our dental OPD with and without symptoms were sent for RAT before entering the OPD area. Informed consent was duly signed by the participants.

Collection of clinical data

Information was gathered from the subjects who visited dental OPD at IGIMS during the rise in peak of SARS-CoV-2 VOCs, over a period of 4 weeks (May to June 2022). All patients who reported to the OMR department were sent for RAT before entering the OPD area. The test was carried out in the Department of Microbiology at our hospital premises using the SD BIOSENSOR antigen kit that is ICMR approved [Figure 1]. The specimen type collected was throat and nasopharyngeal swabs for all subjects. Single examiner with all required precautionary measures recorded the demographic data and symptoms such as cold, cough, fever and breathlessness, independent of whether they reported positive or negative.

Statistical analysis

The software IBM Statistical Package for the Social Sciences (SPSS) statistics 20.0 (IBM Corporation, Armonk, NY, USA) was used for data analysis and to generate tables. Results were obtained in percentage (%).

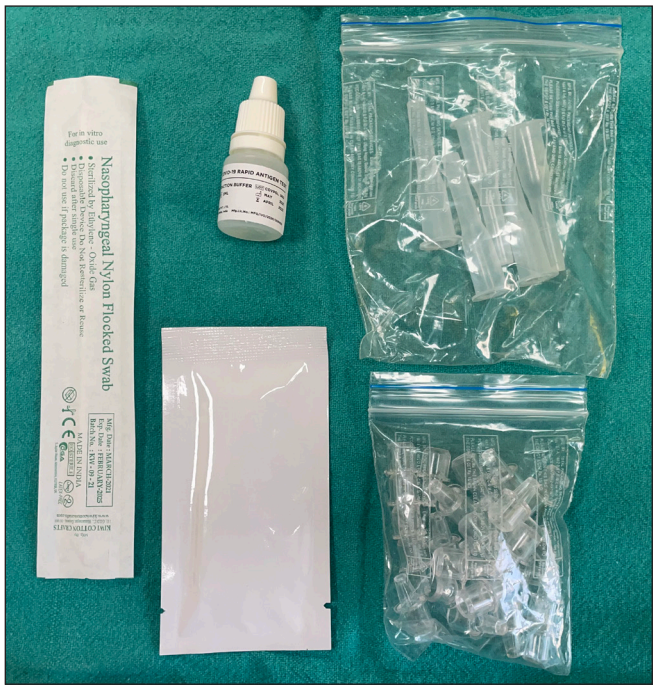

Figure 1: Rapid antigen test kit.

RESULTS

A total of 103 subjects participated in our study, and RAT was done for all subjects keeping in mind the risk of high infectivity in dental operatory. In Novel Coronavirus (NCov), cross-tabulation age was divided as less than 20, 21–40, 41–60 and above 60. Among the less than 20 age group, 22.3% patients had undergone RAT, and all were tested negative. A total of 49.5% among the age group of 21–40 underwent RAT, out of which 46.6% were negative and 2.9% were positive; 21.4% subjects belonged to the 41–60 age group, in which 19.4% were negative and 1.9% were positive; 6.8% subjects belonged to above 60-years group, and all showed negative results [Table 1].

In 50.5% of males, 2.9% tested positive and 47.6% tested negative. In 49.5% females, 1.9% tested positive whereas 47.6% were negative [Table 2].

The most common symptoms observed were cold, cough, fever and breathlessness. It was observed that though among the total patients, 3.9% suffered from cold and cough, and 1.9% tested positive and 1.9% tested negative [Tables 3a and 3b].

Another symptom that an oral physician came across was fever; 6.8% subjects reported to OPD were suffering from fever. Among them, 3.9% had a positive and 2.9% had a negative RAT report [Table 3c].

Table 1: Age group NCov cross-tabulation.

	NCov		Total
	Negative	Positive	
Age Group			
<=20			
Count	23	0	23
% of total	22.3%	.0%	22.3%
21–40			
Count	48	3	51
% of total	46.6%	2.9%	49.5%
41–60			
Count	20	2	22
% of total	19.4%	1.9%	21.4%
>60			
Count	7	0	7
% of total	6.8%	0%	6.8%
Total			
Count	98	5	103
% of total	95.1%	4.9%	100.0%

NCov: Novel Coronavirus

Table 2: Gender NCov cross-tabulation.

			NCov		Total
			Negative	Positive	
Gender	Male	Count	49	3	52
		% of total	47.6%	2.9%	50.5%
	Female	Count	49	2	51
		% of total	47.6%	1.9%	49.5%
Total		Count	98	5	103
		% of total	95.1%	4.9%	100.0%

NCov: Novel Coronavirus

Table 3a: Cold NCov cross-tabulation.

			NCov		Total
			Negative	Positive	
1. Cold	Yes	Count	2	2	4
		% of total	1.9%	1.9%	3.9%
	No	Count	96	3	99
		% of total	93.2%	2.9%	96.1%
Total		Count	98	5	103
		% of total	95.1%	4.9%	100.0%

NCov: Novel Coronavirus

Table 3b: Cough NCov cross-tabulation.

			NCov		Total
			Negative	Positive	
2. Cough	Yes	Count	2	2	4
		% of total	1.9%	1.9%	3.9%
	No	Count	96	3	99
		% of total	93.2%	2.9%	96.1%
Total		Count	98	5	103
		% of total	95.1%	4.9%	100.0%

NCov: Novel Coronavirus

Table 3c: Fever NCov cross-tabulation.

			NCov		Total
			Negative	Positive	
3. Fever	Yes	Count	3	4	7
		% of total	2.9%	3.9%	6.8%
	No	Count	95	1	96
		% of total	92.2%	1.0%	93.2%
Total		Count	98	5	103
		% of total	95.1%	4.9%	100.0%

NCov: Novel Coronavirus

Table 3d: Breathlessness NCov cross-tabulation.

			NCov		Total
			Negative	Positive	
4. Breathlessness	Yes	Count	0	2	2
		% of total	0%	1.9%	1.9%
	No	Count	98	3	101
		% of total	95.1%	2.9%	98.1%
Total		Count	98	5	103
		% of total	95.1%	4.9%	100.0%

NCov: Novel Coronavirus

The symptom which was of most concern was breathlessness; 1.9% subjects had breathlessness, and all were RAT positive [Table 3d].

DISCUSSION

Unique environment of dental setup possesses an increased risk of cross infection with SARS-CoV-2 for both the staff and the patient; the risk is inherent to close contact between these two groups, as well as to the exposure to saliva, aerosol, and other secretions.[10,11] Dental emergency cannot be neglected for longer duration due to considerable impact of oral health on general health. Keeping in mind the emerging variants of virus classified by WHO as variants of interest (VOI) or VOC, only screening and emergency procedures were performed with implementation of strict preventive measures.[12]

ICMR has considered RT-PCR as the gold standard treatment, but RAT has also been useful for screening patients and performing elective dental procedures. In our study, we have used SD BIOSENSOR antigen kits, which are reliable for the diagnosis of SARS-CoV-2 infection, as they fulfilled the general recommendations for the use of these tests that are recommended by the WHO (≥ 80% sensitivity and ≥97% specificity compared with PCR). Though RAT has lower

sensitivity compared with PCR, they improve the turnaround time for results that is key to interrupt transmission chains to control the spread of this pandemic.[13,14]

In our study, the predominant age group affected by COVID-19 was 21–40 years, followed by 41–60 years age group. Males of this age group were at higher risk of getting affected when compared to females that was concurrent to the study by Munayco et al. in 2020.[15,16]

Study subjects presented with various symptoms such as cold, cough, fever, and breathlessness. All the patients reporting with these symptoms in our department were sent for RAT for COVID-19 before entering the OPD as a precautionary measure to control the spread of virus in the dental operatory. It was observed that subjects with these symptoms were not necessarily suffering from COVID-19. But the patient who reported breathlessness along with all the above-mentioned symptoms was found to be COVID-positive. Only emergency procedures were performed, keeping a check on infection control by using aseptic techniques, fumigation of working area, aerosol control management, and using personal protective barriers.

Limitations

The major limitation of our study was the use of antigen-testing method, which may have been affected by conditions such as time from onset of illness, the viral concentration in the specimen, and the quality and integrity of the specimen, and may have given a higher false-negative result.

CONCLUSION

Rapid screening and testing were boon for dental practitioners as it distinguished patients with COVID-19 from those who were healthy or infected with other viruses. It was an emergency and essential need to take required actions, optimize patient care, and maintain the safety of dental patients, practitioners, and healthcare workers too. POC tests delivers rapid, accurate and actionable results to dental clinicians and lower the risks of disease transmission, and contribute to safe patient flow in dental hospitals.

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Ethical approval

The author(s) declare that they have taken the ethical approval from IEC (113/IEC/2021/IGMS).

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Nil.

Conflicts of interest

Prof (Dr.) A.K. Sharma, Dr. Nimmi Singh, Dr. Navin Mishra, Dr. Priyankar Singh are on the editorial board of the Journal.

Use of Artificial Intelligence (AI)-Assisted Technology for manuscript preparation

The authors confirm that there was no use of Artificial Intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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