_____

Detection of Covid-19: Antigen Test Versus RT-PCR

Krati Varshney[1], Sanjeev Dimri[2]*

[1]*Associate Professor, Department of Microbiology, Saraswathi Institute of Medical Sciences, Hapur, Uttar Pradesh, India*
[2]*Professor & Head, Department of Microbiology, Saraswathi Institute of Medical Sciences, Hapur, Uttar Pradesh, India*

Abstract

COVID-19 pandemic has since spread across the globe and is posing a major burden on society. The three important pillars in any country's strategy to tackle the novel coronavirus disease (COVID-19) are trace, test, and isolate. The article aims to evaluate and compare Antigen Test and RT-PCR in terms of accuracy, rapidity, feasibility and economy for diagnosis of COVID-19 disease. A total of 400 naso-pharyngeal swabs were analyzed for antigen test and antigen-negative cases were then subjected to SARS-CoV-2 Real Time RT-PCR (qRT-PCR).
Keywords: COVID-19, RT PCR, Respiratory Syndrome.

Introduction

Coronavirus Disease 2019 (COVID-19), caused by the novel coronavirus, Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2, formerly known as 2019-nCoV), appeared in China for the first time, and subsequently spread worldwide[1].COVID-19 pandemic has since spread across the globe and is posing a major burden on society. The three important pillars in any country's strategy to tackle the novel coronavirus disease (COVID-19) are trace, test, and isolate. Accurate and Validated testing is extremely important as an early diagnosis of patient helps in tracing and controlling the spread of COVID-19[1].The World Health Organization (WHO) has raised a global warning and announced the need for a test system for COVID-19- suspected patients (World Health Organization, 2020). SARS-CoV-2 is known to be spread even by infected people who experience only mild symptoms or rare asymptomatic carriers[2]. This testing strategy relies on robust, rapid, and easy-to-perform diagnostic tools that can be used to test large numbers of samples in a short period of time. To date, the recommended diagnostic method for SARS-CoV-2 infection is real-time reverse-transcription PCR (qRT-PCR), which was introduced in January 2020 and is now applied using World Health Organization (WHO) or US Centers for Disease Control and Prevention (CDC) protocols , as well as various commercial assays[3]. Although

Methodology

This is an observational study which was conducted in the Department of Microbiology, Saraswathi Institute of Medical Sciences, Hapur, UP, India. Four hundred (400) samples from August-2020 onwards were included. Naso-pharyngeal and Oro-detection of viral RNA by RT-PCR is the standard for the diagnosis of COVID-19, need for serologic test is increasing as an alternative diagnostic method and/or seroprevalence studies[4]. This article aims to determine the difference in capacity of antigen test and RT-PCR in detection of COVID-19 effectively and efficiently.

Aim & Objectives

To evaluate and compare antigen test and RT-PCR in terms of accuracy, rapidity, feasibility and economy for diagnosis of COVID-19 disease.

pharyngeal swabs were obtained from suspected cases of COVID-19 disease and collected in the viral transport SARS-CoV-2 antigen test kit (SD Biosensor, Inc. Republic of Korea). Naso-pharyngeal and oro- pharyngeal swabs were again obtained in Viral transport Media from antigen-negative patients. RT-PCR was performed for SARS-CoV-2 in suspected cases of COVID-19 disease with antigen-negative test results. Diagnostic accuracy of antigen test was determined in comparison to SARS-CoV-2 RT-PCR.

Results

Out of 400 suspected cases, 152 were positive and 248 were negative with antigen card test. Two hundred forty eight (248) antigen-negative tests were again subjected to RT-PCR for further confirmation of results. Out of 248 RT-PCR tests performed, 102 (41.12%) were positive by RT-PCR.

_____

Correspondence
Dr. Sanjeev Dimri
Professor and Head,Department of Microbiology,
Saraswathi Institute of Medical Sciences, Hapur, Uttar Pradesh, India
E-mail:sdimri1966@yahoo.co.in

Table 1: Comparison of methods

Methods	Positive	Negative	Total
RT-PCR	102	146	248
Antigen Test	152	248	400

Table 2 differentiates the two techniques on the basis of technical assistance, equipment required,cost and time.

_____

_____

Table 2:Methods and analysis

Methods	Interpretation of data by expert	Techincal Experience	Equipment Required	Finance (Rs)	Time
RT-PCR	Required	Lots of practice	PCR machine, automatic extractor / consumables for manual extraction, biosafety cabinets,-80^0C/-20^0C refrigerators, micro centrifuges, space for performing PCR	1000-2000	2-5 hrs
Antigen Test	Not required	No practice	No equipment required	250	15 mins

Discussion

Antigen detection test and RT- PCR are currently the most widely used methods for detection of COVID-19. Rapid detection and effective treatment of COVID 19 is a prerequisite in reducing the morbidity and mortality due to the disease. It also helps in prevention of spread of SARS COV -2 infection in community. In the present study, we included 400 patients attending hospital over a period of 6 months for various complaints suggestive of COVID-19. We evaluated and compared the two techniques for diagnosis of COVID-19 disease. The antigen-test was easy to use and provided results in a timely manner. Hence, it has the potential to become an important tool for the early diagnosis of SARS-CoV-2 infection, particularly in situations with limited access to molecular methods[3].Importantly, the sensitivity and specificity of the real-time RT-PCR test is not 100%. All of them behind the laboratory practice standard and personnel skill in the relevant technical and safety procedures explain some of the false-negative results[5].

Conclusion

After analyzing the findings of the present study it was concluded that although RT-PCR is gold standard for diagnosis of COVID 19, the antigen test is also helpful for diagnosis of COVID 19. Our data indicate that combining the antigen test with RT-PCR will significantly improve the diagnostic yield. Antigen test is found to be less time consuming and can be an alternative in a resource poor nation and where RT-PCR services are not available. Further, antigen test is simple to perform & cheap when compared to RT-PCR, and rapid, with results being available in 15 minutes when compared to 4-5 hours for RT- PCR.

Whereas RT-PCR assay permitted, sensitive,and specific detection of SARS-CoV-2 in clinical specimens and provided needed diagnostic support during the recent SARS-CoV-2 outbreak. RT-PCR assay can enhance ability to provide a rapid response in the event of the possible return of SARS-CoV-2, only if proper sampling procedures, good laboratory practice standard, and using high-quality extraction and real-time RT-PCR kit could improve the approach and reduce inaccurate results.

Conflict of Interest: Nil
Source of support:Nil

References

1. Robert Kubin et al. Molecular and Serological Tests for COVID-19:A Comparative Review of SARS-CoV-2 Corona-virus Laboratory and Point-of-Care Diagnostics. Diagnos-tics.2020; 10:434.
2. Y Hirotsu et al. Comparison of automated SARS-CoV-2 antigen test for COVID-19 infection with quantitative RT-PCR using 313 nasopharyngeal swabs, including from seven serially followed patients.International Journal of Infectious Diseases. 2020; 99:397–402.
3. Porte et al. Evaluation of a novel antigen-based rapid detection test for the diagnosis of SARS-CoV-2 in respiratory samples .International Journal of Infectious Diseases. 2020;99:328-333.
4. Ko J-H et al. Clinical application of rapid diagnostic test kit for SARS-CoV-2 antibodies into the field of patient care. Journal of Microbiology.Immunology and Infection.2021;54(1):97–100.
5. Alireza Tahamtana et al. Real-time RT-PCR in COVID-19 detection:issues affecting the results.Expert review of molecular diagnostics.2020;20(5):1-5.

_____