TESTING FOR CORONA VIRUS DISEASE -19

Mohammad Noor

Year 2020 will be remembered as annus horribilis in the history of mankind. Corona Virus Disease-19 (COVID-19) was first reported from Wuhan, the capital city of Hubei province of China as unusual pneumonia on December 31, 1 2019 among a few who visited a sea food market where wild animal were also sold[1]. Shortly a novel coronavirus was isolated from these patients, and within the next month the World Health Organization (WHO) declared it as "Public Health Emergency of International Concern". WHO named this disease as new coronavirus disease 2019 (COVID-19) 1 on February 11, 2020. On March 11, 2020, WHO declared COVID-19 as pandemic. In Pakistan, the first confirmed case of COVID-19 was on February 26, 2020 from Karachi [1,2,3,4]. As of 10th March 2021, there are 117,332,262 cases of COVID-19 worldwide & 595,239 in Pakistan. The death tally due to COVID-19 is 2,605,356 worldwide & in Pakistan is 13,324 as of March 10th, 2021[5].

The unprecedented pandemic has hit the heath & financial market badly across the globe. The situation is worse in the developing countries where the heath care resources are already overstretched. Until very late when there was no vaccine & no specific treatment for the disease, the most appropriate way to manage COVID-19 is test, trace & isolate. Countries where robust testing, contact tracing & public education in place have managed the pandemic very well with few numbers of cases & fatalities. The initial approved test for Severe Acute Respiratory Syndrome Corona Virus-2 (SARS-CoV-2) was Reverse Transcriptase-polymerase chain reaction (RT-PCR) only with sensitivity around 70%. However, some of the developed countries & almost all the developing countries had not had the capacity to perform RT-PCR particularly for such unprecedented number. There were problems in the wealthy nations and still there with poor countries related to trained personnel, equipment, infrastructure, regents, personnel protective equipment and so on. Due to restriction of travelling & lockdown there was hardship in terms of availability & transportation of equipment.

Most currently used tests for direct detection of SARS-CoV-2 identify viral ribonucleic acid (RNA) through nucleic acid amplification, usually using Polymerase Chain Reaction (PCR) [6]. The most common sample types being tested are swabs taken from the nasopharynx and/or oropharynx or secretion from lower airways by health care personnel or the patients themselves after being properly instructed[7]. Following collection, swabs are placed into a special reagent to release virus/viral RNA from the swabs into solution. Then, viral RNA is extracted from that solution and subsequently amplified by reverse transcription- It is important to recognize that the accuracy of the test is affected by the site & quality of the sample, and thus it is very important that the sample should be obtained in a proper and safe manner, properly labelled, stored & transported as soon as possible. Testing patients for SARS–CoV-2 helps identifying those who are infected, which is useful for individual patient management, as well as for implementation of mitigation strategies to prevent spread in health care facilities and in the community at large. There are numerous unanswered questions, challenges, and controversies surrounding testing for viral RNA[8]. It is expensive, needs trained personnel, equipment & infrastructure which may not be feasible in many places across the globe amidst the pandemic. RNA may degrade over time. There are concerns that specimen collection for testing will exhaust the supply chain of critical personal protective equipment needed to care for infected patients in the developing countries. Moreover, there are delays in the test results due to transportation & reporting which will affect the management & isolation policies. PCR cannot differentiate between a dead & a live virus. The situation is further complicated by conspiracy theories related to COVID-19 which has deep roots in an illiterate society like Pakistan where many patients are reluctant to be tested for SARS-CoV-2.

The other broad category of tests is those that detect antibodies i.e., IgM, IgA, IgG, or total antibodies against nucleocapsid & spike proteins of SARS-CoV-2[9]. Development of an antibody response to infection is dependent on host immune status and take some time. In the case of SARS–CoV-2, early studies suggest that most patients develop antibodies between 7 and 11 days postexposure to the virus, although some patients may develop antibodies earlier. As a result of this natural uncertain course, antibody testing is not useful in the setting of an acute illness. We do not sure for certain whether individuals infected with SARS–CoV-2 who recover later on will be protected, either fully or partially, from future infection with SARS–CoV-2 or how long protective immunity will last; recent evidence from a rhesus macaque study does suggest protective immunity after resolution of a primary infection. Antibodies test is a useful tool for studying the epidemiology of the pandemic & identifying individuals who may donate convalescent plasma.

Professor of Medicine Khyber Girls medical College Peshawar. KP Pakistan.

Address for correspondence:
Prof. Mohammad Noor
Professor of Medicine Khyber Girls medical College Peshawar. KP Pakistan.
E-mail: noorwazir1966@yahoo.com

A new addition in the COVID-19 testing is rapid antigen test to be used at the point of care. Unlike PCR it uses virus antigens rather than viral genome amplification, from nasopharyngeal/oropharyngeal mucous obtained by HCW or the patient himself. The results are available within a few minutes. A positive test is taken active SARS-CoV-2 infection, but negative test should be confirmed by PCR in symptomatic patient. According to center for disease control (CDC) USA a negative test in an asymptomatic test with no known contact should be taken as negative. However, the sensitivity is lower as compared to nucleic acid amplifications test. some of the issues that may affect the accuracy of a test include ineffective swabbing, cross contamination or mishandling of the sample, or problems with the testing chemicals supplied by the manufacturer. The value of rapid antigen tests is in the frequency of the testing rather than the accuracy, with repeated testing recommended. The test is of great help in mass screening like wedding or religious gathering where a quick testing is needed. Keeping in view the robust results provided by the rapid antigen test federal drugs authority (FDA) gave emergency use authorization[10].

This pandemic has brought humanity close than ever before irrespective of color, ethnicity & religion to be united & be prepared for unforeseen. It is sad to mention that we have fought this pandemic well on the scientific front by close cooperation, exchange of information & research but badly on political front. Many countries isolated themselves politically, blaming others for the pandemic rather than solidarity & unity. This further strengthened the conspiracy theories related to COVID-19 on social media.

REFERENCES

1. WHO Coronavirus (COVID-19) Dashboard | WHO Coronavirus Disease (COVID-19) Dashboard
2. Bahadur S, Rahim F, Amin S, et al. (N/A) Do Laboratory Biomarkers Predict Survival in Severe COVID-19? A Cross-Sectional Study. Cureus (): e. doi:10.7759/cureus.
3. Noor M, Haq M, Ul Haq N, et al. (November 09, 2020) Does Working in a COVID-19 Receiving Health Facility Influence Seroprevalence to SARS-CoV-2?. Cureus 12(11): e11389. doi:10.7759/cureus.11389
4. Rahim F, Amin S, Bahadur S, Noor M, Mahmood A, Gul H. ABO / Rh-D Blood types and susceptibility to Corona Virus Disease-19 in Peshawar, Pakistan. Pak J Med Sci. 2021;37(1):4-8. doi: https://doi.org/10.12669/pjms.37.1.3655
5. https://covid.gov.pk/
6. World Health Organization. 2020. Novel coronavirus (2019-nCoV) technical guidance: laboratory testing for 2019-nCoV in humans. World Health Organization, Geneva, Switzerland. https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/laboratory-guidance.
7. Dhiman N, Miller RM, Finley JL, Sztajnkrycer MD, Nestler DM, Boggust AJ, Jenkins SM, Smith TF, Wilson JW, Cockerill FR, Pritt BS. 2012. Effectiveness of patient-collected swabs for influenza testing. Mayo Clin Proc 87: 548 –554. https://doi.org/10.1016/j.mayocp.2012.02.011.
8. Winichakoon P, Chaiwarith R, Liwsrisakun C, Salee P, Goonna A, Limsukon A, Kaewpoowat Q. 26 February 2020. Negative nasopharyngeal and oropharyngeal swab does not rule out COVID-19. J Clin Microbiol. https:// doi.org/10.1128/JCM.00297-20.
9. https://www.cdc.gov/coronavirus/2019-ncov/lab/serology-testing.html
10. https://www.fda.gov/news-events/press-announcements/coronavirus-covid-19-update-fda-authorizes-antigen-test-first-over-counter-fully-home-diagnostic