OPEN ACCESS

Saudi Journal of Medical and Pharmaceutical Sciences

Abbreviated Key Title: Saudi J Med Pharm Sci
ISSN 2413-4929 (Print) |ISSN 2413-4910 (Online)
Scholars Middle East Publishers, Dubai, United Arab Emirates
Journal homepage: https://saudijournals.com

Review Article

A Critical Review on the New Innovations on Role of Biomarkers and Inflammatory Proteins for Detection and COVID-19

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DOI: 10.36348/sjmps.2021.v07i10.011 | **Received:** 16.09.2021 | **Accepted:** 26.10.2021 | **Published:** 30.10.2021

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Abstract

SARS-CoV-2 is spread by the micro droplets from the infected people or by the contact with the polluted fomites. The coronavirus infects the alveolar and bronchial epithelium cells and travels to the tiny air sacs and to alveoli. Monotonous laboratory-biomarkers can give the complete record of health position of a patient in severe medical situations. ACE2 serves as a regulator of renin angiotensin aldosterone systems, which regulates the blood volume, blood pressure, and balance of electrolytes in the body, in addition to acting as a crucial SARS-CoV and SARS-CoV-2 receptor. Transaminases and lactate dehydrogenase (LDH) are nonspecific indicators of cellular inflammation and damage in COVID-19 patients. Biological materials from COVID-19 individuals have been used in various gene expression analysis, as well as those involving proteomic methods. Imaging biomarkers, which also include the magnetic resonance, positron emission tomography, and computed tomography, are categorized into the several groups according to their activities and properties. High neutrophil count, lymphopenia and leukocytes are the simpler preliminary constraints which directly differentiate between the severe and non-severe coronavirus victims.

Keywords: COVID-19, Blood volume, neutrophils, biochemical detection, respiratory.

INTRODUCTION

The COVID-19 may have a zoonotic-origin, and it spread by human-to-human transmission like sneezing and coughing, just like other respiratory diseases. Although evidence is sparse, studies suggest that even asymptomatic people can be infected [1, 2]. Coronaviruses are the single stranded RNA-viruses with diameter of 80 to 220 nm and a spheroidal shape. SARS-CoV-2 is spread by the micro droplets from the infected people or by the contact with the polluted fomites. The coronavirus infects the alveolar and bronchial epithelium cells and travels to the tiny air sacs and to alveoli. On the other hand, comes with a number of dangers, and unforeseen issues may arise, for instance, later in the vaccination development process. Olink's broad protein biomarker profiling solutions can lessen these risks by providing complete, actionable perceptions in to the related biology for these novel vaccines or repurposed medications [3-5].

Role of biomarkers and inflammatory proteins

Monotonous laboratory-biomarkers can give the complete record of health position of a patient in severe medical situations. Though, no conventional laboratory-biomarkers performed very well in standalone for identifying coronavirus to be employed as a single diagnostic method or to assist doctors in prioritizing the patients for therapy. One of the most common way for diagnosing and detecting COVID-19 is NAAT (nucleic acid amplification testing). This procedure entails using RT-PCR to reverse the transcription of the viral RNA in to cDNA. The

complementary DNA is then amplified in its entirety for identification by fluorescent dye or with the electrical-signals [6-8].

ACE2 serves as a regulator of renin angiotensin aldosterone systems, which regulates the blood volume, blood pressure, and balance of electrolytes in the body, in addition to acting as a crucial SARS-CoV and SARS-CoV-2 receptor. Due to function of ACE2 in SARS-CoV-2 initial attachment, anti-hypertensive drugs such as ACEIs (ACE inhibitors) and ARBs (angiotensin receptor blockers) have raised concerns that they may impact the mortality and severity of the COVID-19. It's a virus that spreads easily from person to person by the aerosols and respiratory-droplets. COVID-19 has 1-14 days incubation duration and causes a respiratory disease with a wide spectrum of medical symptoms and levels of intensity, ranging from asymptomatic individuals to pneumonia, MOF (multiple organ failure) and ARDS, all of which can lead to death. Patients over the age of 65, as well as those with comorbidity such hypertension, chronic obstructive lung disease and diabetes, are more vulnerable to serious disease [9-12].

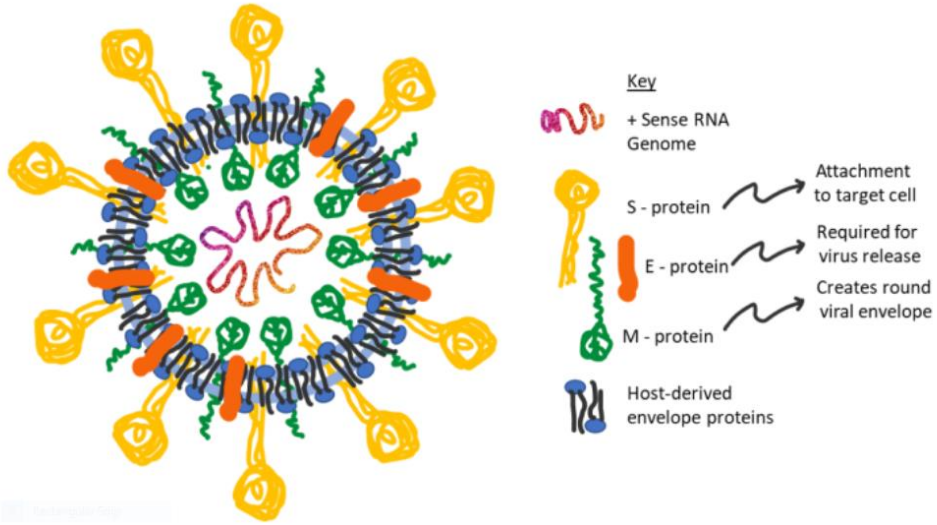

Fig-1: Shows the structure of Coronaviruses with target host

Interleukin (IL)-6, white blood cell (WBC) count, C-reactive protein (CRP), neutrophil count (NC), procalcitonin (PCT), lymphocyte count (LC), neutrophil: D-dimer, activated partial thromboplastin time (aPTT), prothrombin time (PT), and lymphocyte ratio (NLR), are all coagulation and immune inflammatory biomarkers examined in the COVID-19 patients. Transaminases and lactate dehydrogenase (LDH) are nonspecific indicators of cellular inflammation and damage. Various laboratory-markers have been linked to illness severity, prognosis, and outcome. Deranged cell counts, such as polycythemia, leukocytosis, leukopenia, and anemia with the neutrophil predominance and a low platelet count, have been linked to serious disease and a poor prognosis in hospitalized patients [13-15].

As the coronavirus pandemic is still underway, a comparison to the earlier coronavirus related infections like MERS-CoV could be particularly useful. Biological materials from COVID-19 individuals have been used in various gene expression analysis, as well as those involving proteomic methods. Imaging biomarkers, which also include the magnetic resonance, positron emission tomography, and computed tomography, are categorized into the several groups according to their activities and properties. The molecular-biomarkers can be denoted to as proposing biomarkers that have bio-physical uses allow them to be measured as biological samples. Nucleic acid-based biomarkers, such as polymorphs or gene mutations, and quantitative gene expression studies, as well as proteins, peptides, lipid metabolites, and several other molecules, are all examples of molecular-biomarkers. Diagnostic biomarkers, disease staging biomarkers, disease prognostic biomarkers (cancer biomarkers), and the biomarkers used to assess the therapeutic outcome to an intervention are all examples of biomarkers that can be classified based of their function [16-17].

About 3,800 relationships among the acute COVID-19 and immunomodulatory blood-proteins were examined by the scientists. They investigated that some blood protein markers like TNN13, HLA-DQA2 and PRTN3, show substantially a high risk of acute COVID-19, whereas NCR3 and MHCIA were observed to be associated with much lower risk. High neutrophil count, lymphopenia and leukocytes are the simpler preliminary constraints which directly differentiate between the severe and non-severe coronavirus victims. In the ant-viral immune system the T-cells plays vital role, though; but the factors that

induce the reduction in T-cell count and state of T-cell activation in coronavirus patients are yet unknown. Augmented D dimer and prothrombin time values may also be gauges of poor prognosis [18-20].

Neutrophophil-extracellular-traps (NETs) are known to have a role in inflammation-related lung injury, fibrosis and thrombosis, as a result, various researches have been undertaken to provide further insight on the probable role of neutrophophil-extracellular-traps in COVID-19. A recent study looked at postmortem lung's materials from the 4 coronavirus patients and 4 patients who passed away from a coronavirus-unrelated reason for more evidence. According to the World Health Organization, the COVID-19 disease has caused millions of cases and thousands and thousands of fatalities worldwide, with significant health and socio - economic consequences. Coronavirus is caused through severe acute SARSCoV-2 (respiratory syndrome coronavirus-2), that is the 3rd coronavirus to cause the acute respiratory system disease in the humans in addition to SARS-CoV and Middle-East MERS-CoV (respiratory syndrome coronavirus). When all of the evidence is considered, it is very evident that acute COVID-19 pandemic is linked with the significantly augmented neutrophils, infection biomarkers (like CRP, PCT and ferritin), leukocytes, and cytokine levels [tumor necrosis factor (TNF)-α, IL-6, IL-10, IL-2R and IL-8) and decreased lymphocytes count [21-24].

Both the helper T-cells and the suppressor T-cells were found to be less than normal in the COVID-19 individuals, with the lowest rate of helper T-cells linked with the severe instances. Furthermore, in serious forms, the proportion of naive-helper T-cells was observed to be higher, while the proportion of memory-helper T-cells was reported to be lower. Coronavirus patients also have a smaller number of regulatory-T-cells, which are more easily destroyed in the extreme cases. Bats, camels and cats are all known to carry the coronaviruses. The viruses reside in these animals and do not harm them. Viruses can often spread to other species of animals. As the viruses spread to different species, they might change itself (mutate). The viruses can eventually travel between animals' species and infect the people. The first persons contaminated with coronavirus in the Wuhan, China, are likely to have contracted the disease at a food store that served meat, seafood, and other animals — but investigators are all still looking into it. Despite the fact that experts are unsure how persons become infected, they have proof that the disease can be transmitted straight from individual to individual by intimate contact [24-28].

Signs of coronavirus may appear between 2 and fourteen days after the contact to virus. The children have alike, but typically less, signs than the adults. Elder adults and the people who take severe causal curative circumstances like the lung or heart diseases or the diabetes are at high danger of more dangerous complications from the COVID-19. If you come in touch with somebody who has SARS-CoV-2, you're at the significant risk for infection, particularly when you've been subjected to their spit or been near them while they sneezed, coughed or spoke [29-32].

Convalescent-plasma, which was developed for inclusion of patients who were hospitalized or at elevated danger of being hospitalized. However, the most recent research indicates that it has little effect and may even be harmful. It is no longer given due to the development of mabs (monoclonal antibodies). If a person demands oxygen, IV-steroids have been shown to be beneficial. Anti-clotting medicine can also be used in hospitals to reduce the danger of clots caused by COVID-19. Inhibitors of interleukin 6 are also employed [33].

Other coronaviruses, like MERS (Middle East respiratory disease) and SARS are also cured by dealing with the symptoms. New treatments were put to the test in some circumstances to see how efficient they are. Some examples of treatments which are used for these diseases includes: breathing support, blood plasma transfusions, mechanical ventilation, anti-viral or retroviral medications, steroids for the reduction of lung inflammation and swelling. To limit the SARS-CoV-2 pandemic, quick isolation and identification of the diseased persons is crucial, together with isolation and testing of their associations. There are different symptoms have been investigated as related with the COVID-19. US Centers for Disease Control and Prevention suggested that the coronavirus symptoms include chills or fever, difficulty in breathing or shortness of breath, cough, body or muscle aches, fatigue, headache, runny or congestion nose, loss of smell or taste, diarrhea, sore throat and vomiting or nausea. Nevertheless, it is uncertain which symptoms are most useful to diagnose the COVID-19. This is very important in situations where the test supply is very limited [34-37]. COVID-19 is a disorder that could be prevented. The demography of the infection all around the world clearly shows a link between the intensity of public health activity and the transmission-control. Nevertheless, because the majority of the countries have introduced numerous infection control methods, determining the 2 things each is hard. This dilemma is becoming more pressing as more interventions are needed until viable vaccinations or therapies become accessible [38, 39].

CONCLUSION

Personal actions such as use of protective equipment, personal hygiene, and physical separation, case and contact identification for example, reactive

school or workplace closure, test trace track isolate, and the regulatory actions for example, administrative restrictions on crowd or business capacity; proactive workplace and school, stay at home orders and public transport closing or control, indefinite closure or cordon sanitaire all are the examples of coronavirus precautions.

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