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Review Article

COVID-19 and Chronic Diseases: pathophysiology, clinical, gastrointestinal manifestation

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Abstract

The novel coronavirus disease, namely COVID-19, caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has spread worldwide and resulted in a crucial global health problem. Various studies and meta-analyses have demonstrated that chronic disease, including diabetes mellitus, cardiovascular diseases, and Gastrointestinal manifestations, are considered as risk factors for the disease severity, poor prognosis, and mortality in COVID-19. Although the exact reasons for the association between these comorbidities and disease severity and mortality risk of COVID-19 have not clarified, immune dysregulation and hyperinflammation in these chronic diseases might be contributing factors to the progression of the COVID-19. Furthermore, most of the patients with chronic inflammatory disease have the impairment of immune system and inflammatory response due to underlying pathogenesis of their diseases, and thus they might be prone to SARS-CoV-2 infection. We have focused the attention on most common chronic diseases frequently observed in COVID-19 which may be related to infection and their association with course of COVID-19.

Keywords COVID-19, chronic disease, Diabetes, Cardiovascular Diseases

Introduction

Corona virus Disease

The corona virus is a member of a viral family that can cause pneumonia, difficulty breathing, fever, and lung infection among other symptoms (WMHC, 2020). These viruses are common in animals worldwide, but very few cases have been known to affect humans. On December 29, 2019, the World Health Organization (WHO) created the name "2019 novel coronavirus" to describe a coronavirus that infected the lower respiratory tract of pneumonia patients in Wuhan, China (Li et al., 2020; WHO, 2020). And the current reference name for the virus is severe acute respiratory syndrome coronavirus 2

(SARS-CoV-2). It was reported that a cluster of patients with pneumonia of unknown cause was linked to a local Huanan South China Seafood Market in Wuhan, Hubei Province, China in December 2019 (Zhu et al., 2020). The WHO confirmed that the outbreak of the Corona Virus epidemic was associated with the Huanan South China Seafood Marketplace, but no specific animal association was identified (WHO, 2020). On 10 January 2020, a research team led by Prof. Yong-Zhen Zhang published the first genome of COVID-19, which was found to be the source of the new coronavirus (Dadashzadeh et al., 2020). Within 1 month, this virus spread quickly throughout China during the Chinese New Year a period when there is a high level of human

mobility among Chinese people. Although it is still too early to predict susceptible populations, early patterns have shown a trend similar to Severe Acute Respiratory Syndrome (SARS) and Middle East respiratory syndrome (MERS) coronaviruses. Susceptibility seems to be associated with age, biological sex, and other health conditions (Wang et al., 2020).

Corona viruses are a large family of viruses that cause a variety of illnesses varying from the common cold to more serious infections such as SARS, MERS, and Corona virus Disease 2019 (COVID-19). COVID-19 is the most recent strain to infect people. The main symptoms of COVID-19 are high temperature (fever), cough, and shortness of breath. The affected patients develop pneumonia and multi-organ failure ending to death. Almost all expired patients had severe comorbidities, such as cardiovascular disease and diabetes mellitus (Ji et al., 2020). The median time from obvious symptoms to death was two weeks, but in some cases, it lasted up to six weeks (Lupia et al., 2020). Many factors can affect the mortality rate. According to the current research and knowledge, accessibility to medical services, and socioeconomic status can play important roles in this regard (Vuorio et al., 2020). This pandemic infection's fast trend is life-threatening for humans and should be a wake-up call for everyone, especially at-risk patients.

Inflammatory bowel disease (IBD), rheumatoid arthritis and psoriasis share use of immunomodulators and biologic therapies that pose potential enhanced risks in a pandemic. Despite this considerable overlap, specialist societies have not issued joint guidance, understandable given the short timelines of COVID-19 response. The recently written 'shielding' advice for protecting sick and vulnerable patients released by the British Society of Gastroenterology (BSG), the British Society of Rheumatology (BSR) and the British Association of Dermatology (BAD) had some subtle differences that we want to highlight here as a catalyst for enhancing cross-speciality working (Pyle et al., 2017).

Pathophysiology and Clinical Manifestation

The pathogenic mechanism that produces pneumonia seems to be particularly complex. Based on the information available thus far, the viral infection appears to be capable of inducing an overwhelming immunological response in the host. In some cases, a reaction takes place, which as a whole is labelled a "cytokine storm". The effect is extensive tissue damage. The protagonist of this storm is interleukin 6 (IL-6). IL-6 is produced by activated leukocytes and acts on a large number of cells and tissues. It is able to promote the differentiation of B lymphocytes, promotes the growth of some categories of cells, and inhibits the growth of others. It also stimulates the production of acute phase proteins and plays an important role in thermoregulation, in bone maintenance and in the functionality of the central nervous system. Although IL-6's primary function is pro-inflammatory, it can also have anti-inflammatory effects. Inflammatory diseases, infections, autoimmune disorders, cardiovascular diseases, and some

cancers all cause an increase in IL-6. The clinical spectrum of COVID-19 varies from asymptomatic or paucisymptomatic forms to clinical conditions characterized by severe respiratory failure that necessitates mechanical ventilation and support in an intensive care unit (ICU), to multiorgan and systemic manifestations in terms of sepsis, septic shock, and multiple organ dysfunction syndromes (MODS). Asymptomatic infections have also been described, but their frequency is unknown. COVID-19 cannot currently be successfully distinguished from other viral respiratory infections due to a lack of particular clinical characteristics. Headaches, sore throats, and rhinorrhea are some of the less prevalent symptoms. GI symptoms (e.g., nausea and diarrhea) have been described in addition to respiratory symptoms, and in some cases, they may be the presenting complaint. Respiratory droplet transmission is the main route and it can also be transmitted through person-to-person contacts by asymptomatic carriers (Chen et al., 2020).

Cardiovascular Diseases

COVID-19, one of the main causes of cardiovascular disease which can lead to heart failure with pericarditis, myocarditis, and cardiac conduction (Zhang et al., 2020). Patients with cardiovascular disease and over the age of 60, with a history of high blood pressure, obesity with a BMI above 25, and a history of smoking are at a higher risk of COVID-19 infection. Researchers at the Wuhan University of China found that of 416 patients admitted to the hospital, about 20% had severe muscle heart damage due to a severe COVID-19 infection, of whom more than half died. The findings show that patients with heart damage have a very high risk of death. One of the researchers' hypotheses is that the immune system reacts to the COVID-19 infection, which, if not controlled, can cause a condition called "cytokine storm" and damage organs. Another possibility is that in people with cardiovascular disease, the overall stress caused by the infection can damage the heart muscle. Finally, COVID-19 may attack the heart directly. According to research, the virus binds very strongly to angiotensin converter enzyme 2 (ACE2) receptors. These receptors are expressed not only in the lungs but also in other parts of the body, such as the heart and digestive tract. Some hypotheses suggest that common blood pressure medications, such as ACE inhibitors and angiotensin receptor blockers, can be very harmful to people with COVID-19 infection. However, another study claimed that RAS inhibitors might be a good therapeutic choice in patients with COVID-19 infection (Sun et al., 2020). As a result, cardiovascular patients are strongly advised to follow the principles of preventive, personal hygiene, isolation, social distancing, and regular use of cardiac medicines. In the current circumstance, researchers stress the need of preventative actions, suggesting that persons with cardiovascular disease and a history of stroke consider themselves to be at high risk. Without consulting a doctor, these people should not discontinue taking any of their medications (Jin et al., 2020).

Diabetes

High blood sugar levels can damage a person's immune system. The weaker the body's immune system, the lower the ability to fight infections, such as COVID-19; thus, the virus can cause more damage to the body. People with diabetes, like the general population, must take steps to avoid the COVID-19 disease. They should also pay closer attention to their blood sugar levels and avoid changing their prescriptions without visiting a doctor. Some vitamins and minerals play a role in improving the function of the immune system, but the arbitrary and indiscriminate use of supplements containing these micronutrients may cause disorders in the body's function. Therefore, if a person is not nutrient-deficient, it is better to provide nutrients by food sources and avoid taking supplements without consulting a doctor. Recent studies show that there is no specific way to prevent the immune system from infecting people with the COVID-19, diabetes patients (Maddaloni et al., 2020). Relaxation, good sleep, and correct nourishment can all help to boost the immune system.

Gastrointestinal manifestations

Patients infected with SARS-CoV-1 have been reported to present with gastrointestinal, hepatic, and pancreatic involvement. Similarly, reported gastrointestinal symptoms of COVID-19 include anorexia, vomiting, nausea, abdominal pain, diarrhea, and gastrointestinal bleeding. SARS-CoV-2 virus particles were isolated from feces, and endoscopy revealed gut mucosal injury. Further supports the ability of SARS-CoV-2 to exist, replicate, and infect the gastrointestinal tract. Hepatic involvement, including liver damage, has been noted in COVID-19, with elevated alanine and aspartate aminotransferases. Acute hepatitis with severe liver damage presenting prior to typical symptoms of COVID-19 has also been reported, biopsy analyses have revealed pathological features of hepatic injury, including mild lobular and portal inflammation as well as moderate microvascular stenosis. Pancreatic manifestations of COVID-19 have also been reported, including elevated lipase and amylase as well as acute pancreatitis (Xiao et al., 2020). However, long-term surveillance studies are required to determine if gastrointestinal, hepatic, and pancreatic manifestations can persist after acute infection.

Immune System Disorders

With any infection, the immune system reacts by attacking the virus or external bacteria. Immune cells produce cytokines to fight inflammation, but if too many of them are released, these conditions can cause problems in the body. Many of the damages caused by COVID-19 in the body are caused by a condition called sepsis syndrome, which results from complex immune responses (Alhazzani et al., 2020). The infection itself can induce a severe inflammatory response in the body, which might impair the function of several organs. Another thing about the immune system is that so far there have been almost no cases of COVID-19 in children under nine years of age.

Researchers are not sure if children get the infection or if they have mild symptoms that no one notices. Children have milder symptoms than adults when it comes to various infections, such as measles and pneumococcal infections. This could be due to the fact that children have a direct immune response, but adults can occasionally have an over-immune response. (Cristiani et al., 2020).

Conclusions

COVID-19 infection has spread throughout the world, posing a clinical threat to the general public and healthcare workers, exposing pre-existing flaws in chronic care management. There was little proactive outreach to patients with chronic conditions in most clinics, and interdisciplinary teamwork was placed to the back burner. Otherwise, there is reason to be optimistic, as approaches that rely on pre-existing institutions performed significantly better.

Conflict of Interest

The author hereby declares no conflict of interest.

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