

Emergence of the sequels under the COVID-19 epidemic

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Abstract. Under the premise that Covid-19 virus is under better control with the time developed, more attention has being shifted to the sequelae of infecting the corona virus and how to prevent or deal with it. Covid-19 has led to about six hundred million confirmed cases worldwide as of September 12, 2022. It is crucial to get a better knowledge of the pathophysiology of COVID-19 given its global impact and the unknowable long-term consequences. The symptoms of corona virus are gradually being normalized for the whole population, and the attitude towards corona virus in Europe and the United States is gradually loosening, however, it has been proven that the illness during corona virus will last until two to three months after recovery, which is called post-COVID-19 syndrome, which is both physically and psychologically harmful. The main causes of this syndrome may be permanent damage to organs, residual virus in the body, and excessive immune response. Nowadays, the only thing that can be accomplished is to relieve the symptoms of the disease, but unfortunately there is no complete cure for it with the current clinical technology. At present, the epidemic situation continues in the world. Clinicians should improve their understanding of this disease.

Keywords: COVID-19, Sequels, Post-COVID-19 syndrome.

1. Introduction

There have been accounts of patients developing constant symptoms weeks to months after their initial infection since the COVID-19 pandemic began. Early research in Europe found that the majority of patients who were discharged from the hospital still had symptoms. However, it has quickly become clear that patients with mild sickness who did not require hospitalization might also experience chronic symptoms after COVID-19. This is not just true of people who were seriously ill or hospitalized. The phrase "post-COVID-19 syndrome," coined by the Centers for Disease Control and Prevention (CDC), refers to a variety of "new, returning, or ongoing health problems" encountered by persons four or more weeks after contracting the corona virus. There are very few papers reporting post-COVID-19 syndrome, and early reports suggest that as many as 60-80% of critically ill COVID-19 patients present with numerous symptoms 1 month after discharge, the most common of which are fatigue and dyspnea [1].

In addition, up to 2/3 of adults may respond still with the same symptoms at 60 days as SARS-CoV-2 infection [2]. For the post corona virus era, it is an important thing to understand the sequelae of post COVID-19 and to take them seriously in this way. As a highly infectious disease, it is far from enough to simply control the epidemic to prevent it from developing. Cure is the fundamental goal. Therefore, the treatment and cure of the "sequela" of the epidemic is the only way to control the disease, and it is also a subject placed in front of governments and social interfaces. The main purpose of this essay is to discuss in detail the post-COVID-19 sequelae, to give useful information on the disease, its causes and the treatment.

2. Symptoms and sequelae of the corona virus

2.1. Symptoms of corona virus

In addition to the most common generic symptoms of respiratory disease such as fever, dry cough and fatigue, COVID-19 has many complications include thromboembolism or multi-organ failure, sepsis and infectious shock, and may even affect organs, causing heart, liver or kidney damage.

The corona virus attacks mainly the lungs, causing lung infections that lead to pneumonia, massive fluid accumulation in the alveoli, the body needs to operate with greater intensity to keep the blood supplied with oxygen, and the heart is overloaded, adding stress to the already defective hearts of those with heart disease.

Most of the kidney damage caused by the corona virus is in diabetic patients, who have heart and kidney disease. The extra burden of viral infection on the body, along with the relatively weak immune function of diabetics, makes them less able to fight infection. Looking at the overall mortality rate at the beginning of the corona virus epidemic, patients over 65 years of age have a much higher mortality rate than younger people. Most heart patients and diabetics are elderly, all which is why the older will have various physical ailments. Also the age of the elderly has become a big reason. Age continues to be the primary risk factor for mortality in old patients of all ages, according to an examination of data from 154 people in 26 regions. As symptoms of severe pneumonia, dyspnea and chest pain discomfort were more prevalent in died patients, although fever was more noticeable in survivors. This could be as a result of older persons having lower basal body temperatures, which result in fevers with lower maximum temperatures[3].

2.2. Sequelae of corona virus

The CDC defined the sequela of COVID-19 rehabilitation patients as a series of new, recurrent or persistent health problems occurring 4 weeks or more after the first infection with SARS CoV-2. However, the World Health Organization defines it as a symptom that occurs in people diagnosed or likely to be infected with SARS CoV-2, usually 3 months after the first infection, and lasts at least 2 months, and cannot be attributed to other diagnoses. More scholars prefer to use the term "post-COVID-19 syndrome", which includes two elements: first, it occurs after the acute infection period of a coronary artery; and second, it includes many diseases. The individual symptoms that continue to occur after 12 weeks of persistent treatment after a coronary infection are classified here as physical problems and physiological problems.[4]

The symptoms that are actually covered in post-COVID-19 are extremely broad, and the CDC gives several categories for the physiological conditions in post-COVID-19. These include systemic, cardiopulmonary, Digestive tract, and neurological symptoms.

Long-term exhaustion can affect daily functioning by making you feel more exhausted than ever after exerting yourself physically or mentally, or it can result in fever from infections because of a lack in resistance. Cardiorespiratory dysfunction manifests as breathing difficulties or shortness of breath, coughing, tightness in the chest, and rapid heartbeat. symptoms of the digestive tract, such as diarrhea and back pain. The development of neurological problems is the most dangerous. Initially, respiratory issues are COVID-19's most noticeable symptom. A pandemic's effects on the central nervous system (CNS) might appear in a variety of ways, including encephalopathy, encephalitis, headaches, and ischemia. Almost every infected person has at least one disease-born symptom, suggesting that the virus has a high capacity to affect the central nervous system[5]. These include a post-COVID-19 syndrome of great social concern, "brain fog," which refers to the inability to concentrate on thinking, and was one of the first problems to be responded by recovering patients after the corona epidemic flourish in Europe and the United States. This is a neurological symptom that is very unexpectedly associated with respiratory viral infections, and therefore has become the "classic" "post-COVID-19 syndrome".

According to Hannah and others, who created an information sheet designed to find patients with COVID-19 or suspected COVID-19 infection for more than 1 week, data were obtained from 3762 respondents. They found that 85.1% of patients experienced brain fog and cognitive dysfunction, mainly in terms of attention deficit and inability to perform functions, solve problems and make decisions. The symptoms were present in 31.2% of the respondents after one week. 72.8% of the respondents experienced memory impairment, including short-term and long-term memory loss. At post follow-up, 55.9% reported memory symptoms at month 4. Among respondents with symptoms

for more than six months, 50.5% still experienced memory symptoms at seventh month[6]. Cognitive problems will affect the life, especially for employed working people.

There were many psychological problems during the corona epidemic. These types of psychological problems are more common not only in recovered people but also in the general population even during the epidemic. In the post-COVID-19 syndrome recovered people appeared, psychological symptoms manifested in depression, anxiety disorders and post-traumatic stress disorder. Chao-Lin Huang, MD conducted a two-way cohort study of patients discharged from Jinyintan Hospital with confirmed new coronary pneumonia. Of the 2469 discharged COVID-19 patients, a total of 1733 patients were included after excluding 736 discharged COVID-19 patients. The mean age of the patients was 57 years, and 897 were male. It was conducted from June 16 to September 3, 2020. Anxiety or depression was present in 367 of the 1617 individuals. That means in which 23% of the patients reported having anxiety or depression[7].

3. Causes of post-COVID-19 Syndrome

In the era of prevalence of corona virus, everyone around the world is concerned about corona virus, and post-COVID-19 has appeared on the social attention, so what causes it?

3.1. Permanent damage to organs

The first point is due to residual organ damage. The corona virus can damage the heart, liver, kidneys, etc. Damage to these organs can greatly affect the return to normal life of recovered corona virus patients.

Liver injury is particularly common in critical cases of COVID-19 patients, and the severity of COVID-19 may be a risk factor for abnormal liver function. Liver injury may be caused by many mechanisms, such as direct virus damage and immunity injury, drug-induced liver injury, systemic inflammatory reaction, ischemia and hypoxia, and potential recurrence or aggravation of liver disease. Neocoronary pneumonia, especially high-risk severe patients, is complex and severe, often involving the kidneys. AKI is more common in severe patients. Once AKI occurs, it indicates poor prognosis and higher mortality [8].

3.2. Residual virus in the body

It has also been suggested that the virus remaining in the patient's body may be another cause. The causes of this sequela are being studied at home and abroad, but there is no final conclusion. One of the hypotheses is "the theory of virus survival". Specifically, although the patient has been cured of fever and other symptoms after being infected with the new coronavirus, the virus remains in the body and continues to attack human cells and tissues. This determined that if the virus is not cleared in a timely manner, the patient is at high risk for long-term sequelae of corona virus[9].

Inflammation is a normal response of the body to infection or injury, but proteins in the blood suggest that inflammation caused by long corona may cause some symptoms. Meanwhile, antibodies to the autoimmune system have been shown to adhere to human cells for longer periods of time with the corona virus. Autoantibodies are antibodies that mistakenly attack or become entangled with organs or tissues of the body, and they can cause different symptoms depending on the target and form of response.

3.3. Exaggerated Immune response

This hypothesis postulates that in certain individuals, COVID-19 causes an excessive immunological response, which results in an overexcited immune system, which subsequently causes a variety of symptoms. Corona virus infections cause abnormalities in the immune system, and the excessive inflammatory state they induce can cause tissue and organ damage in the body that far exceeds that caused directly by viral infection. Previous studies have shown excessive immune activation and immune-mediated pathological damage in severely ill patients with SARS, et al virus-

associated lower respiratory tract infections. Early, adequate doses of immunoglobulin may be a safe and effective therapeutic strategy to suppress the over-activated immune system in critically ill coronary patients. Excessive amounts of immunoglobulins in the later stages will damage the body.

4. Treatment of post-COVID-19 syndrome

Multisymptomatic individuals with post-COVID-19 syndrome may require care from specialists in many associated medical specialties. Effective treatments are difficult to find until the cause and pathology of the long-term symptoms of corona virus can be determined, and further exploration of the corona virusvirus is still needed. There are currently no proven pharmacological treatments for Corona virus, focusing primarily on managing symptoms and, where possible, gradually increasing the activity.

There is no cure for fatigue, the biggest problem of post-COVID-19 syndrome. Treatment focuses on symptom relief. The most destructive or disabling symptoms should be addressed first. Patients can find relief through a strategy of "scheduling, planning, prioritizing and positioning" activities. This is accompanied by moderate physical activity. Strenuous exercise often exacerbates symptoms, but moderate amounts of stretching, strengthening and aerobic activity can strengthen the immune system. Some patients with fatigue may feel dizzy or nauseous when standing or sitting upright; medications to regulate blood pressure or heart rhythm may be helpful[10].

For patients with respiratory symptoms. Respiratory exercises involving the breathing exercises, the use of supplemental oxygen and the pulmonary rehabilitation can be performed to practice and learn breathing techniques, and in the case of breathing exercises, abdominal breathing and round lip exhalation can be used to promote lung expansion, reduce airway collapse and lower respiratory rate. In addition, those with high levels of sputum and respiratory symptoms can enhance the expulsion of sputum and perform breathing exercises. For the clean part of the airway, sputum should be coughed up as much as possible. Upper limb stretching exercises can also be performed to relax overused and tense respiratory muscles. And relax the muscles of the chest and abdomen by relaxing positions, such as half sitting and high side lying, to reduce breathing discomfort. Patients may need to monitor oxygen saturation levels with a pulse oximeter.

Patients with cardiac symptoms mainly present with: palpitations, chest tightness, shortness of breath after activity, dyspnea on exertion, and may also present with precordial discomfort and angina pectoris, increased or decreased heart rate, and may present with multiple arrhythmias. The treatment with antiarrhythmic drugs like amiodarone in patients with pulmonary fibrotic changes after COVID-19 requires special attention[11]. Rehabilitation may also be received with an independent assessment of cardiopulmonary function, moderate aerobic exercise, muscle strength and muscle endurance training, and should be followed closely during exercise for ECG, blood pressure, and oxygen saturation[12]. Exercise prescription should be adjusted appropriately during the active phase of viral myocarditis. While exercise therapy, it is not advisable to neglect the drug treatment of the patient's underlying disease as well as diet, sleep and psychological guidelines.

For patients with neurological symptoms. The doctor may advise exercise and maintaining physical activity if a patient has cognitive impairment, such as memory loss or brain fog. Memory exercises and the usage of memory aides like planners and calendars may be part of a patient's treatment plan if they have memory problems. For patients with cognitive dysfunction, the Neuropsychological evaluation should be considered in the post-acute setting[13].

Treatment is often referred to the right expert for individuals who exhibit symptoms of renal, liver, or endocrine dysfunction as well as skin diseases and gastrointestinal issues. Patients recovering from COVID-19 with persistent impaired kidney function during post-COVID-19 infection can seek help from a nephrologist at the AKI Survivor Clinic and will receive reasonable treatment[14].

For patients with psychological problems, it is recommended to apply the concept of health management to provide scientific and individualized psychological interventions to maintain a relatively high level of mental activity, good social adaptation and social functioning. Although all

sectors of society have recognized the importance of mental health in recent years, there are very few departments or industries that provide mental health services for newly crowned patients after recovery, the mental health prevention and treatment system is not sound enough, and there is a lack of mental health services at the society-wide level. mental health services for COVID-19 patients after recovery cannot be delayed, and there is an urgent need to establish a professional mental health service team to detect timely There is an urgent need to establish a professional mental health service team to detect the mental and psychological problems of COVID-19 patients after their recovery and to carry out various forms of mental health services.

Research continues on how best to improve the lives of patients with "post-COVID-19" disease. The number of people with long-term symptoms of corona virus appears to be decreasing over time. However, the corona virus only emerges in late 2019, with a global pandemic starting the following year, so long-term data studies are lacking.

5. Asymptomatic or mild cases of COVID-19 occur

Asymptomatic and mildly infected individuals are equally likely to have a "long covid-19". Asymptomatic and incubation periods are different, although both can transmit the virus. The latter means that the virus has not yet caused symptoms of disease after invasion, while the former means that there are no symptoms associated with the infection at all times[15]. There are insufficient convincing data as to whether asymptomatic infected individuals are at risk for potential sequelae. No association has been found between the severity of the infection and symptoms of fatigue. And extreme fatigue is only one of the long-term symptoms of the corona. The aftermath of the corona has also emerged in the medical staff, where limited resources, changing guidelines, and unpredictable workloads have left healthcare workers feeling powerless and losing a sense of control over the medical conditions they can provide during the two-year-plus outbreak. Some health care workers have demonstrated "moral injury" similar to that of veterans suffering from posttraumatic stress disorder (PTSD)[16].

6. Conclusions

Post-COVID-19 syndrome does exist and may affect a number of infected people. The new post-COVID-19 syndrome covers an extremely wide range of conditions, its cause will never be a single factor, and a reasonable response will not be a single one, and needs to include follow-up and research on such symptoms, and should also include support and assistance for those who recover from its effects. However, people do not need to infinitely exaggerate its effects and imagine it as a lifelong sequelae. People should not discriminate against recovered patients in this way. The vast majority of recovered patients affected by post-COVID-19 will improve with time and can return to normal social life completely, and people should not block their path to return to normal on the grounds of imagined sequelae. At present, there are only rehabilitation centers for COVID-19 sequelae in Shanghai and Wuhan in China, and also in Japan, but so far no country can provide a relatively mature and complete solution. Human understanding of COVID-19 is not mature enough to make a final decision at the medical level. In the future, researchers need to conduct more evidence-based research to strengthen people's knowledge of the disease in order to better prevent and treat it.

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