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Symptoms, challenges and consequences of COVID-19 sequelae and their suggestive reforms: An overview

Kalpa MandalDOI: <https://doi.org/10.22271/chemi.2022.v10.i6a.12258>**Abstract**

COVID-19 has been a dreadful experience for the entire globe. Though the world has again picked up the pace in terms of socializing and economic growth, the overall health condition of the substantial population around the globe has deteriorated drastically and is on a continual decline. Symptoms including Fatigue, Headache, sleep disorders, anxiety, loss of taste, lung problems- dyspnea, cough, persistent oxygen requirement, palpitation chest pain, kidney disorder, hair loss, depression, etc have been observed as post COVID syndromes in the COVID affected patients. This review article discusses the persistent symptoms, long-term complications, future challenges, and preventive measures of the COVID affected people.

Keywords: COVID-19, symptoms, challenges, long-term complications, preventive measures**Introduction**

More than two years have passed since the declaration of a pandemic due to SARS-CoV-2 was announced by WHO in march 2020 ^[1]. This disease is highly contagious and hence resulted in very fast transmission ^[2] Within a few days the entire world became infected involving more than 220 countries. With no specific medicine known the cure for this dreadful disease, panic, fear, and anxiety spread exponentially among the people.

Though several studies have been conducted to investigate the post-COVID-19 condition, there has been no agreement on the clinical practice regarding the perfect diagnosis and curative methods. The development of an optimized and standardized method for COVID -19 treatment has been a very big challenge. The virus undergoes fast mutation ^[3] and gives rise to new variants namely alpha variant, beta variant, omicron, etc and which poses difficulty in the development of curative medicines. The main focus on COVID-19 has been on acute illness and on its long-term consequences ^[4]. Patients showed symptoms within a few days of infection, and got cured in a few weeks, but temporarily. It was observed that symptoms persisted for many days, even several weeks and months after acute infection. ^[4]. This was observed not only in patients who were hospitalized with severe infection but also in those who had a milder version of the infection. It was also observed that even young adults without chronic medical conditions showed prolonged symptoms. These have been characterized as a post-COVID syndrome or *post-acute-sequelae of SARS-CoV-2 (PSAC)* infection. Greenhalgh *et al.* for the first-time defined *Post COVID Syndrome* as the associated illness of COVID which extended beyond three weeks and persisted beyond twelve weeks after the onset of the disease. This drastically affected the quality of life and work activities of the affected people. Though various research in this field has been carried out and still is being done, the long-term consequences are still unknown ^[5, 6]. This review paper highlights the symptoms observed in COVID patients, the classification of post COVID syndromes, precautions and vaccine development, and future challenges.

Classification

Different scientists, based on various criteria gave different classifications for post-COVID syndromes. Fernandez -de-las-Penas *et al.* from the Department of Physical Therapy, Occupational Therapy, Physical Medicine and Rehabilitation, Universidad Rey Juan Carlos ^[7]

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proposed a classification that is time-based. The transition phase category includes symptoms that appear 4 to 5 weeks after the onset of the disease.

Phase one category includes acute post COVID symptoms which appear within 5 to 12 weeks of infection, Phase two category includes long post COVID symptoms which appear within 12 to 24 weeks of diagnosis and Phase three category includes post COVID symptoms which last more than 24 weeks of infection.

Amenta *et al.* from the Department of Medicine, Baylor College of Medicine, Houston, also categorized post COVID symptoms into 3 different categories [8]. First category includes residual symptoms which remains even after recovery from acute infection. Second category includes organ dysfunctioning that remains after initial recovery. Third category includes those symptoms which arises after initial infection which may be asymptomatic or mild.

The University of Cincinnati Medical Center for COVID -19 sequelae, based on starting symptoms, time of onset, period of symptoms and duration of quiescence, has classified long COVID-19 syndrome into five different categories. Type one category includes patients with different time of recovery, which is directly proportional to the severity of infection with different organ complications. Type two category includes patients whose symptoms continue for at least six weeks from the onset of infection. Type three category shows patients

with nearly full recovery, or a short duration of quiescence followed by the reoccurrence of symptoms lasting for at least three months or six months. Type four category is characterized by patients who gave positive SARS CoV-2 test but were asymptomatic initially, at the time of diagnosis. They started showing symptoms within 1-3 months or at least 3 months later. Type type 5 category includes those patients who were initially asymptomatic or had very few symptoms at the time of onset of the disease but die within a year [9].

Symptoms

COVID -19 has shown various symptoms, affecting almost every part of the body. [10-11] This research article discusses the various organs affected by the corona virus, their symptoms, and the short-term and long-term consequences of the infection. [12] Initial infection by the coronavirus may show general symptoms like dizziness, fatigue, fever, sore throat, rashes, Change in menstrual cycles, joint or muscle pain, diabetes, high blood pressure, hair loss, etc [13].

Mouth: Loss of taste and smell is an early symptom of COVID-19 infection. Loss of speech is also a serious symptom of COVID-19 [14].

Throat: Coronavirus on entering the mouth attacks the throat which results in irritation and pain in the throat. Coughing also starts with the infection.

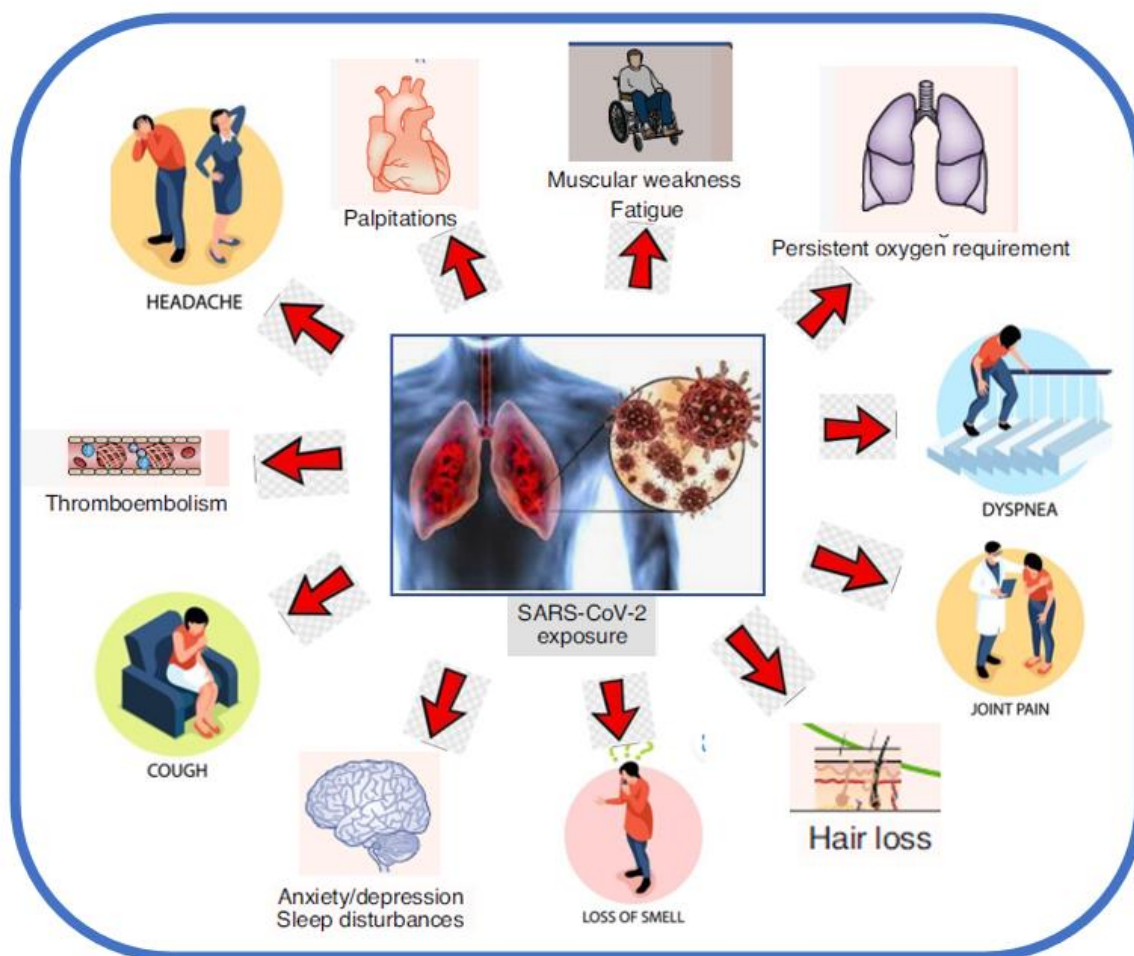


Fig 1: Symptoms of COVID-19

Lungs: Infection of coronavirus to the human body is mostly through the respiratory track. The pulmonary system is thus directly affected and so infection in the lungs is inevitable. Lung inflammation occurs and lot of fluid gets accumulated

in the air sacs of the lungs leading to congestion. This gives rise to shortness of breath making breathing very difficult. Less oxygen reaches the bloodstream. Chronic obstructive pulmonary diseases (COPD) have been reported [15-16].

Stomach: Infection in stomach leads to diarrhea and stomach pain^[17, 18].

Kidney: Several cases of COVID-19 have shown patients suffering from kidney damage after infection. Symptoms of kidney problem include raised levels of protein or blood in the urine. COVID patients with diabetes and high blood pressure increase the risk of kidney disease^[19-21].

Heart: Patient affected with coronavirus has infected lungs which pump less oxygen to the bloodstreams. The heart, therefore, has to work harder to pump blood which proves to be dangerous in patients with pre-existing heart disease leading to cardiac arrest. Insufficient oxygen gives rise to cell death and subsequent tissue damage in the heart. Cardiomyopathy, a heart muscle disorder that affects the heart's ability to pump blood, can occur due to viral infection^[22-24].

Nervous system: Neurological symptoms observed due to corona infection includes depression, anxiety, headache, sleep disorders, difficulty in thinking or concentrating, etc^[25, 26].

Cytokine storm: This is a serious complication of coronavirus when the immune system instead of attacking the invading virus starts destroying the healthy tissues and brings about a damage to the heart, kidney, liver and other organs^[27, 28].

Post COVID complications are very challenging and have shown symptoms lasting not only for a few weeks but even for months after COVID-19 infection. People severely affected by COVID-19 have a risk of developing Multisystem inflammatory syndrome (MIS) in which inflammation occurs in different organs of the body including brain, lungs, heart, gastrointestinal organs, kidney, eyes, skin etc resulting in multiorgan dysfunctioning over a period of time^[29].

Various psychiatric and neurological disorders are observed as post COVID syndrome which may also be associated with Alzheimer's disease^[30]. Other symptoms include depression, post-traumatic stress disorders, sleep disturbances and cognitive impairment^[31].

Though the symptoms of post COVID syndrome has persisted in many people, evidences have shown that time acts as a healing factor. Majority of patients with post COVID syndrome have started showing improvement over a period with no further sequelae^[32].

Prevention and vaccine development

Since COVID-19 is a fast-transmitting disease, keeping social distancing, wearing of masks, frequent use of hand sanitizers, regular steaming, and covering mouth and nose with bent elbows or tissue while sneezing or coughing will help to keep yourself and others safe. Upon testing positive for COVID - 19, quarantine (Self-isolation) is a means to check the transmission. The development of vaccines for the treatment of COVID-19 gave some relief as a curative means to fight against the deadly disease. It is an additional measure toward an attempt to control the pandemic. Natural immunity along with vaccine-induced immunity appears to be the safest and effective way of safeguarding against COVID-19. Vaccines prompt the immunological system for making antibodies without causing you to get ill^[34]. Though some side effects like headache, fever, chills, fatigue, and soreness at injection site have been recorded, in majority of cases these symptoms disappear quickly. Reports have shown that vaccination has helped in providing protection against COVID-19^[35]. Unvaccinated people had higher risk of omicron infection than those who had received three doses of the vaccine^[36].

Vaccination has shown a sustained level of protection as compared to those who have not been vaccinated^[37].

Future Challenges

The COVID-19 pandemic has shown the ignorance of common people towards health care in the past. It is therefore expected that people at large will be more aware of health-related issues, take preventive measures and seek medical guidance for clinical diagnosis at an early stage in case of any illness. Reports have shown that vaccination has provided relief to patients with symptoms of headache, fatigue, muscle pain, insomnia, breathlessness, and gastrointestinal symptoms. The long-term complications of post COVID syndrome still continue to unfold, therefore progress in therapeutics and vaccines for a complete cure needs to be effectively worked upon.

Conclusion

This article is an overview of the published works on post COVID syndromes. The pandemic has shown the world that none of us are safe until all are safe, therefore we must think beyond our limited field of view. Being active and aware for the nation and world, should be the basic understanding. Learning a lesson from the past, the global community needs to be vigilant and active to follow preventive measures and prevent any epidemic to convert into a pandemic.

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