



## Editorial Letter

### Post-COVID-19 Syndrome

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Dear editor,

On 30 January 2020, a public health emergency of international significance was declared due to the new disease: COVID-19, an infection caused by a virus never before identified in humans, SARS-CoV-2. The virus belongs to the family Coronaviridae, genetically placed within the genus Betacoronavirus. It is an RNA virus covered by a capsid and a pericapsid; it is criss-crossed by glycoprotein structures that give it the typical appearance of a crown; it binds to the cell through the interaction of the spike protein with the cellular receptor angiotensin-converting enzyme 2 (ACE2) [1,2,3]. In addition to the definition, the mode of transmission of the virus has also been configured: inhalation, ingestion and direct mucosal contact with droplets of saliva. Crucially, the virus can survive on hands, objects or surfaces that have been exposed to infected saliva [3]. The infection caused by the SARS-CoV-2 virus is recognized as being responsible not only for a pulmonary syndrome but for a multi-organ syndrome. After the initial acute infection, like many other viral diseases, numerous long-lasting symptoms have been described. During the 2020s, an increasing number of case reports, case series, and small observational studies have reported long-term complications of Coronavirus Disease 2019 (COVID-19), referred to as post-COVID-19 syndrome [4]. The post-COVID-19 syndrome was detected in patients who had recovered from an acute coronavirus infection (SARS-CoV-2) [5]. Some patients continued to have signs and symptoms of the disease four weeks after the initial diagnosis of SARS CoV-2 infection, which could not be attributed to other diseases [6]. Observational studies and data from medical records have shown that post-COVID-19 syndrome occurs in 10–30% of cases, with signs and symptoms that can last for several months [4-6]. Preliminary data from

the 'COVERSCAN' clinical study have recently been published. This study was carried out on 201 people with an average age of 45 years (range, 21-71 years) and was conducted between April and September 2020 [4]. The 'COVERSCAN' study aimed to assess mid- and long-term organ impairment in individuals with persistent symptoms after initial recovery from acute infection compared to healthy patients of the same age. This study population was at low risk of COVID-19 mortality and only 19% were admitted to the hospital [4]. However, four months after the initial SARS-CoV-2 infection, 40% of subjects had ten or more symptoms of post-COVID-19 syndrome and 60% had severe symptoms, which included dyspnea (88%), headache (83%), fatigue (83%) and myalgia (87%) [4]. Mild cardiac impairment was present in 26% of cases, lung function impairment in 11%, and liver function impairment in 12%. Single-organ impairment was present in 70% of cases and multi-organ impairment in 29% of cases [4]. In May 2021, Daugherty and colleagues published the results of a retrospective analysis of US patients to assess the prevalence of persistent symptoms after the acute phase of SARS-CoV-2 infection in 193,113 adults aged 18-65 years [5]. This study identified more than 50 clinical manifestations in patients who had recovered from the acute phase of SARS-CoV-2 infection. Chronic respiratory failure, hypercoagulation states, cardiac arrhythmia, myocarditis, peripheral neuropathy, encephalopathy, hyperglycemia, fatigue and anxiety as well as cognitive disturbances emerged from the post-COVID-19 syndrome. Post-COVID-19 syndrome was more common in the elderly with pre-existing poor conditions and in patients who had been hospitalized due to an acute SARS-CoV-2 infection [5]. However, it has been shown that individuals of all

ages and without previous illnesses who were not initially hospitalized also developed the same post-COVID-19 syndrome [6]. Not only that, in children and adolescents, the multisystem inflammatory syndrome can occur acutely following SARS-CoV-2 infection [7]. A cross-sectional study conducted between March and October 2021 in Italy on 129 patients diagnosed with SARS-CoV-19 infection from early childhood to 18 years of age (mean age 11 years and 48.1% female) reported that during SARS-CoV-19 infection, 25.6% were asymptomatic and 4.7% were hospitalized, of which 2.3% were in the pediatric intensive care unit [8]. Following acute SARS-CoV-2 infection, 2.3% developed multisystem syndrome and 1.6% developed myocarditis; 35.7% had one or two symptoms; 22.5% had three or more symptoms related to post-COVID-19 syndrome; and 41.8% recovered completely [8-9]. A recent review by US researchers summarized the effects of post-COVID-19 syndrome and how there is a need for a multidisciplinary approach to the management of patients suffering from this syndrome [10]. Planning long-term healthcare resources for the management of post-COVID-19 syndrome is beginning to influence healthcare services. Health economics can best 'capture' the impact of post-COVID-19 syndrome, as up to 30% of the associated health care expenditures may be due to syndrome-induced disability rather than mortality. The healthcare burden due to COVID-19-induced disability in all age groups could be as high as 30% [11]. Longitudinal studies need to be conducted to assess the health effects and long-term economic impact of living with chronic diseases due to post-COVID-19 syndrome [12]. The pathogenesis, risk factors and treatment of the numerous clinical components of post-COVID-19 syndrome should be studied in parallel with their effects on society and health economics [10-13]. Although mass vaccination has alleviated the health, social and economic burden associated with COVID-19 syndrome, the clinical manifestations of post-COVID-19 syndrome and its prevalence in all age groups in individuals apparently recovered from acute SARS-CoV-2 infection are now recognized. However, the effects on society, the economy and health care have not yet been disclosed as studies are still being conducted. What is certain is that SARS-CoV-2 infection and its variants are now endemic, so post-COVID-19 diagnosis and management should become a global public health priority.

**Keywords:** Long COVID, Post-COVID-19 syndrome, Post-COVID-19 condition.

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