

COVID-19 DISEASE AND ITS IMPLICATIONS AND SEQUELS: A LITERATURE REVIEW

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Abstract: Introduction: The current health context is linked to the pandemic of the new coronavirus, called SARS-COV-2, formed by RNA and with multisystemic action. The form of the disease ranges from asymptomatic to very severe cases, which can lead to death. **Objective:** To carry out a bibliographical survey regarding the main implications and sequelae of COVID-19 in patients affected by the SARS-COV-2 coronavirus. **Methodology:** This study is an integrative literature review, and used articles from the PUBMED, LILACS and MEDLINE databases, from 2020 to 2022, searching six descriptors: "Covid-19", "Cardiovascular diseases", "Acute kidney injury", "Neurological pathology", "Sequelae" and "Respiratory system", locating 18 eligible studies. **Results and Discussion:** The most evident sequelae were in the respiratory, cardiovascular, renal, musculoskeletal and neurological systems. The causes were multifactorial, such as advanced age, personal morbid history and degree of inflammatory response. Patients with moderate COVID-19 also developed sequelae. The reported complications required intensive and multidisciplinary intervention. **Conclusion:** All patients with SARS-COV-2 are likely to have multisystem involvement, which refers to the broad public health strategy.

Keywords: Comorbidities; Covid-19; Sequelae.

INTRODUCTION

The current period of global public health is linked to the pandemic of the new coronavirus. Called SARS-COV-2, it consists of an RNA-virus that transmits the disease COVID-19, and whose initial records date back to 2019, in China, causing pneumonia. The disease was declared by the World Health Organization (WHO), at the beginning of 2020, a Public Health Emergency of International Concern, and at the end of that year, there were almost

58 million cases reported worldwide, with 1.3 million deaths (HIGGINS et al., 2020; WHO, 2022).

The virus has a multisystem action, and is highly transmissible via the respiratory route, ranging from asymptomatic to severe cases, which can lead to death. The most common symptoms include fever, fatigue, dry cough, myalgia and upper airway congestion (CAMPOS et al., 2020; HAN et al., 2020). In Brazil, the disease arrived in February 2020, generating more than 680 thousand deaths accumulated in less than three years. In this scenario, COVID-19 has forced nations to structure their health services to treat severe cases and sequelae (BRASIL, 2021; HAN et al., 2020; WHO, 2020).

Among the justifications for carrying out this study, we can highlight that COVID-19 is an unusual, emerging disease, with high economic repercussions, great potential for deaths and disabilities for the world population. In addition, due to the incipient knowledge about it, generating a desire for broad discussion to better elucidate its repercussions on those affected, and thus minimize its impacts on society. In addition to these points, there is an urgent need to base the work of professionals on prevention, control, treatment and rehabilitation of recovered patients, as well as the possibility of assisting local health policies in decision-making, since sequelae may mobilize broad public health strategies and multidisciplinary approaches.

OBJECTIVE

Carry out a bibliographic survey to identify the main implications and sequelae of COVID-19 in patients affected by the SARS-COV-2 coronavirus.

METHODOLOGY

The study consisted of an integrative

literature review, which combined studies with different methodologies and integrated the most relevant results on the repercussions and sequelae of COVID-19. The research was carried out with scientific studies from the years 2020 to 2022, and included electronic articles, exposed in the databases *Science Direct*, *National Library of Medicine National Institutes of Health* of the USA (PUBMED), *Latin American and Caribbean Literature in Health Sciences* (LILACS), *Cochrane Collaboration e Medical Literature Analysis and Retrieval System Online* (MEDLINE).

In directing the research, six descriptors were used: “Covid-19”, “Cardiovascular diseases”, “Infectious diseases”, “Acute kidney injury” “Neurological pathology” and “Respiratory system”, searched alone or associated with each other, and their respective in English. Initially, 384 articles were identified. Of these, 64 were chosen based on relevance.

Using selection and eligibility methods such as: English, Portuguese and Spanish language; studies published between 2019 and 2022; and with questions related to COVID-19, 68 articles were selected. These had their abstracts analyzed and, after exclusion criteria for publications that were not directly related to the subject under study, 18 articles were included to participate in the study, which were examined through analytical reading.

RESULTS AND DISCUSSION

After the acute phase of the disease caused by the coronavirus, the so-called “long covid” can occur when clinical cases present a prolonged time course of the disease, with important medical findings associated with various organ systems. The latency for the full recovery of patients can occur even in moderate cases of COVID-19, causing implications for the survivors’ daily activities (BAIG, 2020). The sequelae encompassed the

biopsychological fields of individuals, mainly affecting the respiratory, cardiovascular, renal, musculoskeletal and neurological systems, with a latency for the full recovery of patients who had moderate conditions (NOGUEIRA et al., 2021; SANTANA et al., 2021).

Among the repercussions found were pulmonary fibrosis, myocardial injury, stroke, encephalopathy, acute renal failure, depression and anxiety disorders. Scientists were still investigating whether the damage was caused directly by the virus or by indirect factors linked to the disease. It is believed that there is an “inflammatory storm”, generated by the immune system to annihilate SARS-COV-2, flooding the body with cytokines that end up damaging the organs (ESTRELA et al., 2021; HAN et al., 2020).

Several studies have pointed out unusual manifestations of post-acute COVID-19 infection sequelae. A summary of the articles selected for this bibliographic review is presented in table 1.

Author / Year	Title	Main repercussions of the disease COVID-19 found
ABREU <i>et al.</i> , 2022.	Post-COVID-19 neurological sequelae: a literature review: Neurological sequelae after COVID-19: a review of the literature.	They identified post-COVID-19 patients with increased rates of peripheral neurological impairment, cognitive changes, impaired memory and reasoning ability, in addition to moderate to severe anxiety.
BAIG, 2020	Deleterious Outcomes in Long-Hauler COVID-19: The Effects of SARS-CoV-2 on the CNS in Chronic COVID Syndrome.	He described the so-called “long covid”, clinical cases with a prolonged course of the disease and repercussions on different organ systems, which occur even in moderate cases of COVID-19.
BARÓN-SÁNCHEZ <i>et al.</i> , 2020.	Affection of the sense of smell and taste in mild coronavirus disease (COVID-19) in Spanish patients.	Changes such as reduction or loss of smell and taste were more commonly found in patients from Spain with mild to moderate COVID-19 infections.

CARFÍ <i>et al.</i> , 2020.	Persistent Symptoms in Patients After Acute COVID-19.	In Italy, of the group affected by COVID-19, only 12.6% had severe conditions, but 87.4% of the patients in the group had persistence of at least one symptom, between fatigue and shortness of breath, for about two months after hospital discharge. In more severe cases, the sequelae observed were pulmonary fibrosis, with reduced organ function.	RUAN <i>et al.</i> , 2020.	Clinical predictors of mortality due to COVID-19 based on an analysis of data of 150 patients from Wuhan, China.	They identified clinical predictors (CP) in post-discharge COVID-19 patients who died, such as increased cardiac troponin, myoglobin, C-reactive protein and Interleukin-6.
<p>Table 1 - Synthesis of studies by name of authors, year, title and main results</p> <p>Source: prepared by the author.</p>					
GONZÁLEZ <i>et al.</i> , 2021.	Cutaneous manifestations in patients with COVID-19: clinical characteristics and postulated pathophysiological mechanisms.	Colombian scholars described in a bibliographic review the cutaneous manifestations associated with the COVID-19 disease, such as rashes, generalized urticaria, purpura, acral ischemic phenomenon, blisters and dry gangrene.	<p>A study published in the <i>Journal of the American Medical Association</i> (JAMA) stated that, among 143 patients affected by COVID-19 in Italy, only 12.6% had severe conditions, but 87.4% of them had persistence of at least one symptom, between fatigue and shortness of breath, for a period longer than two months after hospital discharge (CARFÍ <i>et al.</i>, 2020).</p> <p>The post-COVID-19 manifestations in the analyzed studies were installed due to multifactorial causes such as advanced age, personal morbid history, immune system response, association with genetic factors and the degree of inflammatory response with formation of biochemical releasers. The highest risk comorbidities described were diabetes, hypertension, asthma and cardiovascular diseases (MUNYAPP; GUBBI, 2020; WADMAN <i>et al.</i>, 2020).</p> <p>Scientific studies have identified clinical predictors (CP) in post-discharge patients who died, such as increased cardiac troponin, myoglobin, C-reactive protein and Interleukin-6 (RUAN <i>et al.</i>, 2020).</p> <p>In 2020, a German survey, using a sample of 100 recovered from COVID-19, observed that 78% of them had some type of heart anomaly for a period longer than two months after hospital discharge. Furthermore, patients with cardiovascular disease, when infected with SARS-CoV-2, had an increased risk of death (PUNTMANN <i>et al.</i>, 2020). In more severe cases, sequelae can generate fibrosis in</p>		
MAO <i>et al.</i> , 2020.	Neurologic Manifestations of Hospitalized Patients With Coronavirus Disease 2019 in Wuhan, China.	About 36% of those surveyed in this study from China developed neurological manifestations in COVID-19, mainly affecting patients with severe infection and the elderly.			
MO <i>et al.</i> , 2020.	Abnormal pulmonary function in COVID-19 patients at time of hospital discharge.	A study carried out in China with patients who developed non-critical cases of COVID-19, revealed that the lung is the organ most affected by the COVID-19 disease, whose damage included diffuse destruction of the organ.			
PECLY <i>et al.</i> , 2021.	A review of Covid-19 and acute kidney injury: from pathophysiology to clinical results.	A Brazilian study describes that severe infection by SARS-Cov-2 is expected in about 5% of patients, who may develop multiple organ dysfunction syndrome. One-third of these critically ill patients develop acute kidney injury (AKI), and more severe pulmonary involvement is associated with a worse evolution of the clinical picture in AKI.			
PUNTMANN <i>et al.</i> , 2020.	Outcomes of Cardiovascular Magnetic Resonance Imaging in Patients Recently Recovered from Coronavirus Disease 2019 (COVID-19).	German research showing that 78% of those recovered from COVID-19 had some type of cardiac anomaly. In addition, it showed that patients with preexisting cardiovascular diseases had an increased risk of death.			

the lung, with reduced organ function (CARFÍ et al., 2020).

Other studies have shown active post-infection patients with increased rates of peripheral neurological involvement, cognitive changes, impairment of memory and reasoning ability, in addition to moderate to severe anxiety (ABREU et al., 2022; WANG et al., 2020; YANG et al., 2020). A 2019 study in Wuhan, China, pointed out that, of a total of 214 patients with COVID-19, about 36% developed neurological manifestations. This sequel mainly affected patients with more severe infection and the elderly (MAO et al., 2020).

When the system investigated was the renal system, the evidence showed a high incidence of kidney failure in critically ill patients, as shown by a study with 5,449 patients hospitalized in New York, which revealed 36.5% of the sample with sequelae of acute renal failure (PUNTMANN et al. al., 2020).

The analyzed studies show that it is still necessary to advance in scientific information about the interaction between the pathology and the organic systems, in order to guarantee provision through these presentations. The COVID-19 post-ICU syndrome, with several severely affected organ systems, was evident in survivors of the severe forms (MAO et al., 2020). However, attention is drawn to patients with a moderate infection, who have been slow to fully recover, developing sequelae and complications that required intensive rehabilitation intervention, covering several professional areas.

CONCLUSION

In general, all patients with SARS-COV-2 are likely to have multisystem involvement, determining the severity of the disease. COVID-19 opens a discussion on the rehabilitation of recovered people, where the possible sequelae generated will mobilize a

broad public health strategy, with the need for a multidisciplinary approach and planning of adequate assistance to these demands.

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