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POST-COVID SYNDROME: POST-COVID-19 PULMONARY COMPLICATIONS AND THEIR IMPACT ON QUALITY OF LIFE IN ADULTS: AN INTEGRATIVE LITERATURE REVIEW

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Abstract: Introduction: Post-COVID-19 symptoms are persistent even in mild cases, and the consequences of the infection include fatigue, dyspnea, tachycardia, loss of muscle mass and decreased functional capacity. Studies show that cardiopulmonary rehabilitation can improve patients' functional capacity, quality of life and prognosis. Covid-19 causes changes in lung function with the formation of hypoxemic respiratory deficiency and compliance, thus highlighting the need for studies on the disease and pulmonary complications. **Objective:** The aim of this study was to describe the main pulmonary clinical manifestations and their repercussions on the quality of life of patients affected by post-Covid-19 syndrome. **Method:** This is an integrative literature review, using the PICO strategy with the following guiding question: "What are the main pulmonary manifestations after COVID-19 and their main impacts on the quality of life of adults?" **Results/Discussion:** 14 articles were selected, which helped in the preparation of this research based on highlighting and understanding the nuances of pulmonary complications after COVID-19. **Conclusion:** It is concluded that pulmonary complications resulting from Covid-19 can compromise the quality of life of those affected in general, causing difficulty in carrying out activities of daily living that include the capacity for mobility and resistance.

Keywords: Long Covid, Post-Covid-19 complications in adults, Post-Covid syndrome, Quality of life.

INTRODUCTION

For many years, various diseases have afflicted the world's population, with viral diseases taking center stage. In ancient times, viral diseases left a bloody and obscure trail that, surprisingly, with similar traits and high contamination rates, has resurfaced in the 21st century (NOGUEIRA; SILVA, 2020).

In March 2020, the World Health Organization - WHO officially declared the COVID-19 pandemic, emphasizing it as a public health emergency of international concern (BUS; ÁLCAZAR, GALVÃO, 2020). By June 2021, WHO estimates pointed to around 173 million infected people worldwide, including an average number of 3.72 million deaths due to complications triggered by this virus (RHMAN, 2020).

SARS-CoV-2 belongs to the *betacoronavirus* genus, responsible for causing Severe Acute Respiratory Syndrome. SARS-CoV-2 is the etiological agent of COVID-19 and its genetic material is single-stranded RNA surrounded by a lipoprotein capsule, which easily binds to the ACE2 enzyme (angiotensin-converting enzyme2) expressed on the surface of various cells in the body, such as the epithelium of the respiratory system, facilitating the pathogen's entry into the human body (NOGUEIRA; SILVA, 2020).

The airways are usually a gateway for the virus because the respiratory epithelium's tissue receptor is composed of angiotensin-converting enzyme 2 (ACE-2), thus facilitating the arrival of this component in the highly vascularized cells of the lung, spreading the virus rapidly throughout the body (WAN et al, 2020).

When it enters the human body through the respiratory tract, patients may not show signs and symptoms, being classified as asymptomatic or they may manifest signs and symptoms, with mild cases being limited to flu-like symptoms for approximately five to seven days, while the severe form evolves with signs and symptoms of discomfort, suffering and respiratory distress, with clinical, laboratory and imaging changes compatible with pneumonia being common (BRUGLIERA, L, 2020). In severe cases, bilateral interstitial infiltration occurs, causing changes in ventilation/perfusion and the shunt can probably cause respiratory failure due to hypoxia (BRITO AZEVEDO et al, 2021).

According to ADMON et al, 2022, the possible sequelae that may remain after recovery from COVID-19 are under study, in association with research into the influence of the virus on the body's organs, systems, functions and senses.

Although the majority of COVID-19 patients recover completely, without sequelae, many patients may continue to show symptoms of COVID-19 after recovering from the infection and others may even develop new symptoms. Altogether, this clinical spectrum that occurs after acute infection is called post-COVID syndrome (PCS) (Fontana et al, 2021).

Some authors have defined PCS as the presence of signs and symptoms after acute COVID-19 infection for more than 4 weeks. However, a wide variety of symptoms have been reported within PCS involving multiple organs and systems, requiring long-term follow-up, and even readmission due to the severity of PCS (ANAYA et al, 2021).

Post-COVID-19 symptoms are persistent even in mild cases, and the consequences of infection include fatigue, dyspnea, tachycardia, loss of muscle mass and decreased functional capacity. (TOZATO, 2020).

Symptoms can be intermittent or fixed, and may be the result of chronic fatigue following viral infection, social isolation, organ damage and/or the effects of severe hospitalization/post-intensive care syndrome, regardless of the degree of manifestation and symptoms of COVID-19 (CAROD-ARTAL, 2021).

For Barker-Davies RM (2020) and Tsutsui M (2021), considering that the sequelae of survivors can dominate the care scenario for years, rehabilitation services around the world are faced with the great challenge of meeting a demand beyond the conventional.

The rationale behind the long-term follow-up of patients treated with a diagnosis of COVID-19 consists of the identification and monitoring of early, medium and prolonged respiratory complications; early detection and treatment of life-limiting complications, such as pulmonary fibrosis and pulmonary vascular disease; assessment of the patient's dyspnea, need for oxygen, provision of rehabilitation, palliative care, symptom management and psychosocial support; ensuring the radiological resolution of clinically recovered patients and identifying and managing previous undiagnosed respiratory diseases. (Iuliano et al. 2022).

Among the predisposition or exacerbation of pathological respiratory conditions that Covid-19 can generate is pulmonary fibrosis characterized by scarring of the lungs (Spagnolo, 2020). Fibrosis can be stable or progressive with periods of rapid exacerbation and a decline in lung function, worsening symptoms and quality of life and early mortality. Advanced age is a risk factor for the development of pulmonary fibrosis in inflammatory lung diseases, which explains why the elderly population has an increased risk of fibrotic development after infection with SARS-CoV-2 (McDonald, 2021).

Observational studies carried out around the world on Covid-19 survivors and patients affected by post-Covid syndrome show that systemic changes secondary to infection are respiratory, neurological, cardiovascular, gastrointestinal, skeletal muscle, renal, genitourinary and sense organs, as well as psychopathological manifestations, which lead to a decrease in the quality of life of these patients when compared to the general population, increasing their level of dependence, risks of new pathological processes and morbidity and mortality (SANTANA; FONTANA; PITTA, 2021).

According to Silva (2022) Despite the need for quality studies to support these new modalities of pulmonary rehabilitation care, the efforts of the scientific community and rehabilitation professionals around the world to improve care for patients suffering from the consequences of post-COVID-19 syndrome are evident. Patients undergoing a therapeutic pulmonary rehabilitation plan, especially those who use oxygen therapy for their treatment, are advised to practice low-intensity exercise (less than or equal to 3METs), in addition to monitoring vital signs.

BACKGROUND

The review was conceived due to the large number of cases of adults seen in the medical clinic of a public hospital in the metropolitan region of Recife who had pulmonary manifestations after infection with Covid-19 associated with a reduction in their quality of life.

OBJECTIVES

GENERAL OBJECTIVE

To describe the main pulmonary clinical manifestations and their repercussions on the quality of life of patients affected by post-Covid-19 syndrome.

SPECIFIC OBJECTIVE

- Discuss the main respiratory manifestations in adults affected by COVID-19.
- To identify the impact on the quality of life of people with pulmonary complications in the post-COVID 19 syndrome.

METHODOLOGY

This study is an integrative literature review, using the PICO strategy with the following guiding question: "What are the main pulmonary manifestations after COVID-19 and their main impacts on the quality of life of adults?". Searches were carried out in the following databases: SCIELO, PubMed, BVLS in English, Portuguese and Spanish between 2020 and 2022, using the following descriptors: "long COVID", "post-COVID complications in adults", "post--COVID syndrome" and "quality of life". As a result of the search, 88 articles were obtained and, after analyzing the inclusion and exclusion criteria, 47 articles were selected.

STUDY PERIOD

This study was carried out from September 2022 to May 2023.

INCLUSION CRITERIA

Articles published from 2020 to 2022

Articles researched in reliable sources such as pubmed, scielo and bvls

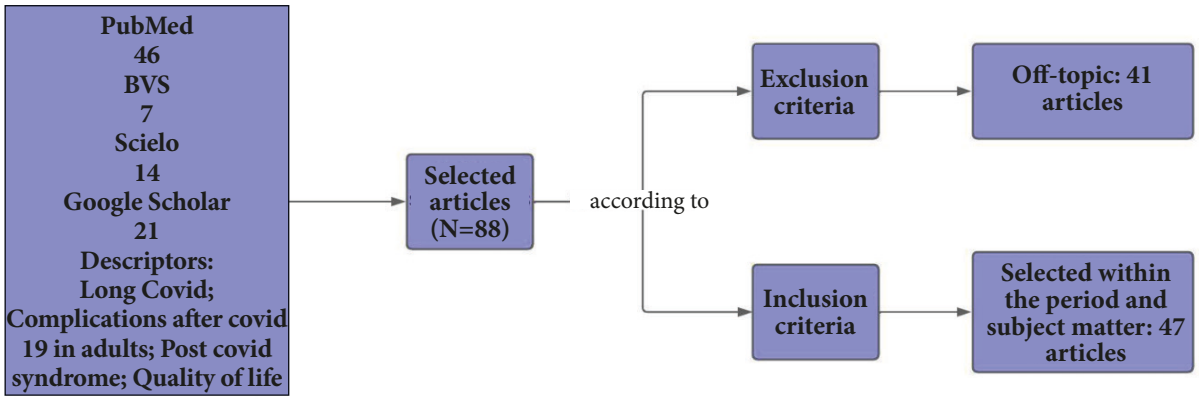
Articles in English, Portuguese and Spanish

EXCLUSION CRITERIA

Articles that don't cover the topic to be discussed

FLOWCHART SHOWING DATA COLLECTION

Flowchart of articles found and selected after applying inclusion and exclusion criteria according to descriptors and databases.



THEORETICAL BACKGROUND

In December 2019, many cases of pneumonia of unknown etiology were identified in Wuhan, Hubei province, China. The studies and reports in the literature show that the patients affected by this new pneumonia lived or worked in a local seafood wholesale market (HUANG, C. Et al, 2020). The main clinical feature of these patients was the development of severe symptoms of acute respiratory infection, with some suddenly developing acute respiratory distress syndrome (ARDS), acute respiratory failure and other complications (ROSAS et al, 2021).

In the early days of January/2020, the Chinese Center for Disease Control and Prevention (CDC) identified a new Coronavirus from a patient's throat swab sample and it was subsequently named 2019-nCov, then renamed again as COVID-19 (WU; MCGOOGAN, 2020).

According to the classification of the International Committee on Taxonomy of Viruses (2020), coronaviruses belong to the order *Ni-*

dovirales. The Coronaviridae family is made up of four genera: *Alphacoronavirus, Betacoronavirus, Deltacoronavirus and Gammacoronavirus*. Alphacoronaviruses and Betacoronaviruses have infectious characteristics restricted to mammals, causing respiratory system infections in humans. Coronaviruses are enveloped, single-stranded RNA viruses with a diameter of approximately 60 to 140 nm, with proteins on the surface that make projections of 9 to 12 nm, forming the appearance of a "sun corona" (GITAÍ, *et al*. 2021).

Nasal and bronchial epithelial cells, as well as pneumocytes, are the targets of the virus. This interaction occurs due to the "S" or *spike* protein (SARS-CoV-S) that binds to the angiotensin-converting enzyme 2 (ACE2) receptor (WAN, 2020). Both ACE2 and serine protein type 2 (PSTT2) are expressed on target cells in the host, mainly type II alveolar epithelial cells. Through the activity of PSTT2 and the ACE2 cleavage process, the virus is taken up and subsequently activates SARS-CoV-S proteins, culminating in the internalization of the virus in the host cells (DE ALMEIDA et al., 2020). Once the virus has entered the lung and airway epithelium, it can produce an inflammatory response, which varies greatly between different patients in terms of both its intensity and the type of inflammatory cells activated. Pathological findings indicate that patients infected with COVID-19 have diffuse alveolar damage with edema, hemorrhage and interalveolar fibrin deposition (JIN, 2020).

As a result of these changes, individuals infected with COVID-19 show the initial signs/symptoms of the disease, which resemble a common flu-like illness, but vary from person to person, and can manifest mildly, in the form of pneumonia, severe pneumonia and SARS (WHO, 2020). Most infected people have the mild form of the disease (95%), with some symptoms such as malaise, fever, fatigue, cough, mild dyspnea, anorexia, sore throat, body pain, headache or nasal congestion, and some may also have diarrhea, nausea and vomiting (MS, 2020).

Of the clinical manifestations that patients can present regarding the respiratory system, coughing, phlegm production, sneezing, chest pain, hemoptysis and dyspnea stand out (CAFÍ, 2020). According to a study, dyspnea appears on average 8 days after severe infection (pneumonia), and can develop into SARS between the eighth and fourteenth day.

Pneumonia is a very common complication of COVID-19. Patients most often present with fever, cough, dyspnea and bilateral pulmonary infiltrates, which are not always detectable on X-rays (WANG, 2020). The main clinical findings present in hospitalized patients, reported by the Chinese Center for Disease Control and Prevention, including 44,500 confirmed cases, were dyspnea and mild pneumonia in 81% of cases; of which 14% were patients considered severe, presenting with hypoxia or >50% pulmonary impairment between 24-48 hours. Respiratory failure in patients classified as critical, shock or multiple organ failure occurred in approximately 5% of cases (WU; MCGOOGAN, 2020). A large number of patients affected by COVID-19 recover fully, but some remain with long-term sequelae in various systems of the body, including the respiratory, cardiovascular and nervous systems, as well as psychological problems. These new, recurrent or persistent clinical manifestations, present after acute SARS-CoV-2 infection and not attributed to other causes, are called "post-COVID-19 conditions" (MS, 2021).

Post COVID or Long COVID syndrome is a multi-systemic condition involving a range of symptoms, such as: fatigue, shortness of breath, cough, chest pain, heart palpitations, fever, headache, muscle pain, gastrointestinal problems, loss of taste and smell. They may

also experience psychological insults and cognitive disorders such as depression, anxiety and post-traumatic stress disorder (NICE, 2020). After following up a total of 134 patients, who attended consultations after discharge from a COVID-19 pneumonia admission (median=113 days / range=46-167 days), at a University Hospital, 86% reported the persistence of at least one residual symptom, with no link to the severity of the acute illness. The authors also report that none of the patients had resistant radiographic abnormalities, and that women were more likely to report residual symptoms such as anxiety, fatigue and myalgia (SYKES et al., 2021). Logue et al. (2021) found in a prospective longitudinal study (cohort) carried out in the United States (USA) that around 30% of patients persisted with residual complaints up to the 9th month of follow-up, with the majority of these patients having the mild/moderate form of the disease, and were followed up as outpatients (LOGUE, 2021).

In a multicenter study involving 38 hospitals in the Michigan region and including 1,250 patients followed up by telephone, 32.6% of the 488 patients who completed the 60-day follow-up phase had persistent symptoms and in 18.9% the symptoms were exacerbated or new manifestations appeared (CARFÍ, 2020).

Since the lungs are the organs most involved and the prolonged and persistent effects post-COVID are mainly related to the lungs, it is essential to define and predict the outcome and determine the individuals who may develop fibrosis (fibrosis occurs as a consequence of the lung injury repair process) and loss of lung function (SANTANA; FONTANA; PITTA, 2021).

Chronic respiratory failure and permanent pulmonary fibrosis can develop in patients who have been intubated with acute respiratory distress syndrome (ARDS) and received invasive mechanical ventilation (IMV) therapy (BAQUI, 2020). In addition to the detriments of hospitalization and/or prolonged inactivity, the persistent high inflammatory burden and previous health conditions appear to negatively influence the recovery of these patients (GEHA et al., 2021). In COVID-19 disease, pulmonary artery wall thickness increased twofold compared to those infected with H1N1 as seen in vascular and pulmonary autopsies (YANG, et al 2020).

The thickening caused by COVID-19 is believed to play an important role in the development of acute respiratory failure, so we can think that patients recovering from COVID-19 may be prone to developing PAH with right heart failure. The most severe patients often require respiratory support, which can range from oxygen therapy to prolonged invasive mechanical ventilation (KHALIL; DA SILVA KHALIL, 2020).

Among the respiratory clinical presentations present in Long COVID, residual cough or persistent dyspnea are symptoms frequently reported after the acute phase. The presence of underlying causes should be assessed and initial management carried out. Despite the scarcity of data on the pulmonary complications of COVID-19, evidence suggests that interstitial lung disease and pulmonary vascular disease are the most relevant complications that can occur in some cases with prolonged respiratory symptoms (TANNI,2021).

Studies show that even after the clinical cure of this virus, many individuals may experience persistent respiratory symptoms, the most commonly reported being cough, dyspnea and fatigue (ISER, 2020; FRANCO, 2021), in addition to functional changes in the respiratory system, which can affect long-term quality of life and the ability to carry out daily activities (CHEN, 2022).

Due to the severity of pulmonary impairment in some patients (CAMPOS, 2020), it is essential to carry out an adequate

clinical study to assess and monitor these sequelae in order to define rehabilitation and treatment strategies, thus ensuring a better long-term quality of life for affected patients.

When talking about quality of life, it is known that there are several factors in the individual's life that influence this issue: social, medical, physical, psychological and others. Quality of life can be considered a reflection of the individual's perception of whether or not their needs, happiness and self-realization are met (CARVALHO et al, 2021).

Post-COVID-19 syndrome is considered a public health problem due to the disability it generates and the growing number of patients experiencing this entity (NOAL; PASSOS; FREITAS, 2020). It is a complex and heterogeneous syndrome in terms of its clinical manifestations and occurs in different age groups, even after mild forms of the disease. The signs and symptoms are multisystemic, varied, overlapping, persistent, in outbreaks and fluctuating over time, which limits quality of life and delays the patient's reintegration into daily activities (MINISTÉRIO DA SAÚDE, 2020).

Post-COVID-19 organic and functional changes can impair the ability to carry out activities of daily living, as well as altering work activities and making social interaction more difficult. Furthermore, all this damage can make individuals more sedentary, increasing the chances of comorbidities. Even in the face of efforts to reduce the risk of mortality, existing health services need to be readjusted, including strategies to provide physical-functional recovery and social reintegration of these individuals through pulmonary rehabilitation (SANTANA; FONTANA; PITTA, 2021).

RESULTS AND DISCUSSION

AUTHOR/ YEAR	LANGUAGE	TITLE	CONCLUSION
BRITO-AZEVEDO et al., 2021	English	SARS-CoV-2 infection causes pulmonary shunt by vasodilatation	Observational study in which ten patients were recruited. One patient was excluded due to poor echocardiographic image quality. Eight patients were on invasive ventilation and one without it on oxygen supplementation with 15 L/minute. Among the patients included, seven (78%) had intrapulmonary vascular dilatation (IPVD), including the one without invasive ventilation.
FONTANA et al., 2021	English	Understanding viral shedding of severe acute respiratory coronavirus 2 (SARS-CoV-2): Review of current literature	SARS-COV-2 RNA shedding may be prolonged, but there is high heterogeneity. The detection of viral RNA may not correlate with infectivity, since the available viral culture data suggest shorter durations of viable virus shedding.
ANAYA et al.,2021	English	Post-COVID syndrome. A case series and comprehensive review	Post-covid syndrome is mainly characterized by musculoskeletal, pulmonary, digestive and neurological involvement, including depression. It is independent of the severity of the acute illness and the humoral response. The study confirms long-term immunity to SARS-CoV-2, but also the inter-individual variability of the immune response.
TOZATO et al., 2021	Portuguese	Cardiopulmonary rehabilitation in post-COVID-19 patients: case series	The physical exercise program based on the principles of cardiovascular and pulmonary rehabilitation had a positive impact on the cases monitored, with an improvement in functional capacity, even with the variability in the severity of the post-COVID-19 cases.

CAROD-ARTAL, 2021	English	Post-COVID-19 syndrome: epidemiology, diagnostic criteria and pathogenic mechanisms involved	Post-COVID-19 syndrome is not a homogeneous or unique entity, and there has been a wide variation in estimates of its incidence and prevalence. Post-COVID-19 'recovery' cannot be based solely on negative PCR or hospital discharge. There is a marked variation in the duration, severity and fluctuation of symptoms, which can affect the quality of life, functional status, cognition and mood of survivors and lead to severe disabilities.
SANTANA, FONTANA, PITTA, 2021	Portuguese	Pulmonary rehabilitation after COVID-19	Pulmonary rehabilitation is mainly recommended to favor the physical-functional recovery of post-COVID-19 patients during hospitalization and after discharge. Current rehabilitation guidelines for this population are mainly based on preliminary results, expert opinion and previous evidence on the rehabilitation of patients surviving critical illness.
ROSAS et al., 2021	English	Tocilizumab in hospitalized patients with severe Covid-19 pneumonia.	In a randomized study involving patients hospitalized with severe pneumonia caused by Covid-19, the use of tocilizumab did not result in a significant improvement in clinical status or lower mortality than placebo at 28 days.
CARFÌ, 2020	English	Persistent symptoms in patients after acute COVID-19	This study found that in patients who recovered from COVID-19, 87.4% reported persistence of at least 1 symptom, mainly fatigue and dyspnea.
WANG et al., 2020	English	Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in Wuhan, China.	In this single-center case series of 138 hospitalized patients with confirmed NCIP in Wuhan, China, hospital transmission of 2019-nCoV was suspected in 41% of patients, 26% of patients received ICU care and mortality was 4.3%.
SYKES et al., 2021	English	Post-COVID-19 symptom burden: what is long-COVID and how should we manage it?	It reports data consistent with current evidence on the prevalence of post-COVID-19 symptom burden. Demonstrating an absence of association between symptom burden and radiographic or biochemical abnormalities. Suggesting that the long Covid phenomenon may not be directly attributable to the effect of SARS-CoV-2, but rather neuropsychiatric insults may play a greater role in its etiology.
LOGUE et al., 2021	English	Sequelae in adults at 6 months after COVID-19 infection	The research indicates that the health consequences of COVID-19 go far beyond acute infection, even among those with a mild illness. Comprehensive long-term research will be needed to fully understand the impact of this evolving viral pathogen.
BAQUI et al., 2020	English	Ethnic and regional variations in hospital mortality from COVID-19 in Brazil: a cross-sectional observational study	The study presents evidence suggesting a higher risk of death among brown and black Brazilians and in the northern region of Brazil. The results suggest that the main metropolitan areas may be particularly affected and that it is highly plausible that viral spread may be particularly rapid in these locations.
GEHA et al., 2021	Portuguese	Comparative epidemiological analysis between the pandemics caused by the Influenza A (H1N1)pdm09 and SARS-CoV-2 viruses in the state of Pará, Brazil	The results found in this study demonstrate the discrepancy between the impact of the two pathologies in the state of Pará, with COVID-19 having an approximately 60-fold higher number of infected people than influenza A(H1N1)pdm09.
YANG, 2020	English	Clinical course and outcomes of critically ill patients with SARS-CoV-2 pneumonia in Wuhan, China: a single-centered, retrospective, observational study.	The study concludes that the mortality of critically ill patients with SARS-CoV-2 pneumonia is high. The survival period for non-survivors is likely to be 1 to 2 weeks after ICU admission. Older patients (>65 years) with comorbidities and ARDS have a higher risk of death. The severity of SARS-CoV-2 pneumonia places great pressure on hospital intensive care resources, especially if they are not adequately staffed or resourced.
MARTIM-BIANCO et al.	English	Frequency, sings and symptoms, and criteria adopted for long COVID -19: A systemativ review	The frequency of prolonged COVID-19 reached up to 80% in the included studies and occurred between 3 and 24 weeks after the acute phase or hospital discharge. Chest pain, fatigue, dyspnea and cough were the most reported clinical manifestations attributed to the condition. Based on these systematic review findings, there is an urgent need to understand this emerging, complex and challenging medical condition. Proposals for diagnostic criteria and standard terminology are welcome.

POENARU ET AL.	English	COVID-19 and post-infectious myalgic encephalomyelitis/chronic fatigue syndrome: a narrative review.	Although the symptom patterns observed in post-acute COVID-19 are similar to those observed in ME/CFS, further investigation with longer follow-up periods and clearly defined diagnostic criteria will be required to establish COVID-19 as an infectious trigger for myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS)
KOROMPOKI et al.	English	Epidemiology and organ specific sequelae of post-acute COVID19: a narrative review.	Early recognition of long-term effects and thorough follow-up through dedicated multidisciplinary outpatient clinics with a carefully integrated research agenda are essential for the holistic treatment of COVID-19 survivors.
GOËRTZ et al.	English	Persistent symptoms 3 months after a SARS-CoV-2 infection: the post-COVID-19 syndrome?	In previously hospitalized and non-hospitalized patients with confirmed or suspected COVID-19, multiple symptoms are present around 3 months after symptom onset. This suggests the presence of a "post-COVID-19 syndrome" and highlights unmet health needs in a subgroup of patients with "mild" or "severe" COVID-19.
WU et al.	English	3-month, 6-month, 9-month, and 12-month respiratory outcomes in patients following COVID-19-related hospitalization: a prospective study.	The study's findings highlight the importance of respiratory monitoring of COVID-19 patients and that studies are needed to mitigate the long-term consequences of COVID-19 pneumonia, including pulmonary rehabilitation and new therapeutic approaches

In this context, the COVID-19 pandemic has highlighted the importance of analyzing the consequences of the new virus on the respiratory system of the affected population. This information is corroborated by Campos 2020, who reports an increase in cases worldwide, and the different clinical presentations of the disease have led to growing concern about the possible pulmonary sequelae in post-COVID-19 patients.

Some patients may develop symptoms after being infected with SARS-COV-2, which is called Post-Covid Syndrome or Long Covid, which according to MARTIMBIANCO ALC, et al., 2021 is a term used by researchers to designate a series of debilitating and persistent physical and psychological signs and symptoms, beyond the usual time, presented by patients who are already in the recovery phase of the SARS CoV -2 infection.

Post-COVID-19 syndrome was defined as symptoms that developed during or after COVID-19, continued for ≥12 weeks and were not explained by an alternative diagnosis (PEGHIN et al., 2021).

The pathophysiology of Long COVID is uncertain, and more studies are needed to clarify it, as POENARU S, et al., 2021, point out. The pathophysiological mechanism of post-COVID 19 syndrome and its long-term consequences is still unknown, mainly because there have been dozens of reports of different symptoms.

However, post-COVID-19 syndrome is more common in patients who have had severe cases of COVID-19. This information is supported according to Carfi et al.2020 through a study published in the Journal of the American Medical Association (JAMA) which found that in 143 patients evaluated in Italy, only 12.6% had been admitted to an ICU, but 87.4% reported persistence of at least one symptom, including fatigue and shortness of breath, more than two months after being discharged.

Among the multiple systemic alterations, attention is drawn to those of the respiratory system, which cause a reduction in lung function as a result of the aggressions occurring in the structure of this apparatus, as confirmed by KOROMPOKI E, et al., 2021. The pulmonary involvement of COVID-19 is due to fibrotic and non-fibrotic interstitial changes, organizing pneumonia, bronchiectasis and pulmonary embolism.

The respiratory symptoms that continue the most are mainly cough and dyspnea. In a study by GOËRTZ et al. (2021), which included 2113 participants, 71% continued to complain of dyspnea 79 days after the acute phase. And 5% of the patients in the study by WU et al. (2021) persisted with dyspnea symptoms even 12 months after the onset of the disease.

The aforementioned changes affect patients› functionality head-on and consequently impair their ability to carry out activities of daily living, altering their professional performance and hindering social interaction, thus reflecting on people's quality of life, which according to CARVALHO et al, 2021 is a reflection of the individual's perception of the fulfillment or otherwise of their needs, happiness and self-realization.

CONCLUSION

An analysis of the research carried out shows that there is a need for more scientific studies on the virus and clinical manifestations during and after COVID, since little is known about these aspects.

At the same time, it is important for health professionals to be trained in how to better manage the symptoms that the individual presents during the phase after the acute infection, so that the damage can be minimized. It should be noted that for this to happen more effectively, multiprofessional and interdisciplinary action must be taken, since the disease is multisystemic.

Furthermore, the managers' perception of the need to organize a network flow in order to meet the existing demands of people with COVID-19 sequelae is urgent.

These proposals have a positive impact on harm reduction, reducing the morbidity and mortality levels of affected individuals and improving their quality of life.

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