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MALNUTRITION IN PATIENTS WITH COVID-19: SYSTEMATIC REVIEW

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ABSTRACT

Patients infected with severe acute respiratory syndrome coronavirus type 2 (SARS-CoV- 2), patients hospitalized for COVID-19, and patients recuperating (sometimes over several months) from the acute disease all display the same symptoms: exhaustion and a low functional level. The loss of muscle mass and cachexia, as well as the malnutrition and complex metabolic alterations that are frequently associated with these conditions, are thought to play a significant role in both the acute clinical problems and the long-term health damage caused by post-COVID-19 chronic disease. Patients with moderate COVID-19 who are treated at home are at a higher risk of malnutrition. Changes in smell and taste, as well as weariness and a lack of appetite, have been identified as very common symptoms in COVID-19 patients, which may reduce the amount of food ingested. Because to COVID-19 symptoms, patients may be restricted to their homes, limiting their physical activities. This can cause a loss of lean mass. Malnutrition may occur as a result of these reasons and a systemic inflammatory response in people who aren't being treated in hospitals.

Keyword: *Cahexcia Syndrome, COVID-19, Infection, Malnutrition,*

INTRODUCTION

A novel variety of coronavirus that causes respiratory tract infections is called the SARS CoV-2 (Severe Acute Respiratory Syndrome Coronavirus-2). The first case of this virus was discovered on December 31, 2019, in China. The World Health Organization (WHO) designated Coronavirus Disease 2019 as the new coronavirus discovered after examination of isolates from the patient's lower respiratory tract (Covid-19). The third coronavirus to be discovered in the last 18 years, Acute Respiratory Syndrome Coronavirus-2, is extremely contagious and spreads between species.[1,2]

Patients who are infected with severe acute respiratory syndrome coronavirus type 2 (SARS-CoV-2), patients who are hospitalized for COVID-19, and patients who are recovering (often over the course of many months) from the acute illness all exhibit the same symptoms, which are fatigue and a poor functional status. The loss of muscle mass and cachexia, as well as the malnutrition and complex metabolic alterations that are often associated with these conditions, are thought to be a major contributing factor in both the acute clinical problems and the longer term damage done to the health of patients who are affected by post-COVID-19 chronic disease.[3]

The Mini Nutritional Assessment score was utilized in a total of two investigations that involved 395 hospitalized COVID-19 patients to investigate the prevalence of malnutrition in COVID-19 patients. They discovered that 42% of hospitalized patients with COVID–19 were at risk of malnutrition, and that 28% of these patients were considered malnourished at the time that they were evaluated. According to the criteria established by the Global Leadership Initiative on Malnutrition (GLIM), another study with 114 consecutive COVID19 patients who were hospitalized found comparable results, concluding that 42% of these patients were malnourished.[4–6]

Patients diagnosed with mild COVID-19 who are treated at home have an increased risk of malnutrition. Changes in smell and taste, as well as exhaustion and a lack of appetite, are noted as relatively prevalent symptoms in COVID-19 patients,[7] which could decrease the amount of food that is consumed. Because to COVID-19 symptoms, patient may be confined to they home, which might reduce the amount of physical activity do. This can result in a loss of lean mass. Even in individuals who aren't being treated in hospitals, malnutrition could develop as a consequence of these causes and a systemic inflammatory response.[8]

This article investigates association between malnutrition in patients woth COVID-19.

METHODS

Protocol

The methodology for this study was based on the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) 2020 guidelines. These factors influenced the rules that were enacted.

Eligibility Criteria

This literature review seeks to demonstrate the relationship between malnutrition and patient with COVID-19 by assessing or analyzing previous research on this topic. This is a major concern raised in the research currently being looked at. Researchers enter research that meets the following requirements, including: 1) To be considered for publication, articles must be written in English and highlight or focus on discussing the malnutrition and patient with COVID-19. 2) Articles published after 2020, but before this systematic review period were considered for this evaluation. The following types of writing will not be considered for inclusion in publication, for example: editorials, submissions that do not have a DOI, review articles that have already been published, or entries that are very similar to those that have already been published in a journal.

Search Strategy

The search for studies to be included in the systematic review was carried out from January, 17th 2023 using the PubMed and SagePub databases by inputting the words: "malnutrition", and "COVID-19". Where *("malnutrition"[MeSH Terms] OR "malnutrition"[All Fields] OR "malnutrition s"[All Fields] OR "malnutritional"[All Fields] OR "malnutritions"[All Fields]) AND ("covid 19"[All Fields] OR "covid 19"[MeSH Terms] OR "covid 19 vaccines"[All Fields] OR "covid 19 vaccines"[MeSH Terms] OR "covid 19 serotherapy"[All Fields] OR "covid 19 nucleic acid testing"[All Fields] OR "covid 19 nucleic acid testing"[MeSH Terms] OR "covid 19 serological testing"[All Fields] OR "covid 19 serological testing"[MeSH Terms] OR "covid 19 testing"[All Fields] OR "covid 19 testing"[MeSH Terms] OR "sars cov 2"[All Fields] OR "sars cov 2"[MeSH Terms] OR "severe acute respiratory syndrome coronavirus 2"[All Fields] OR "ncov"[All Fields] OR "2019 ncov"[All Fields] OR (("coronavirus"[MeSH Terms] OR "coronavirus"[All Fields] OR "cov"[All Fields]) AND 2019/11/01:3000/12/31[Date - Publication]))* is used as search keywords.

Data retrieval

The author modified the inclusion and exclusion criteria after conducting a literature review that included a review of the titles and abstracts of prior research. The updated criteria are included in the research's accompanying supplementary materials. This elucidated the problem's scope and highlighted the aspects that require additional investigation. After conducting research on additional studies with a comparable format, the author arrived at this conclusion. During the systematic review process, only studies that satisfied all inclusion criteria were considered.

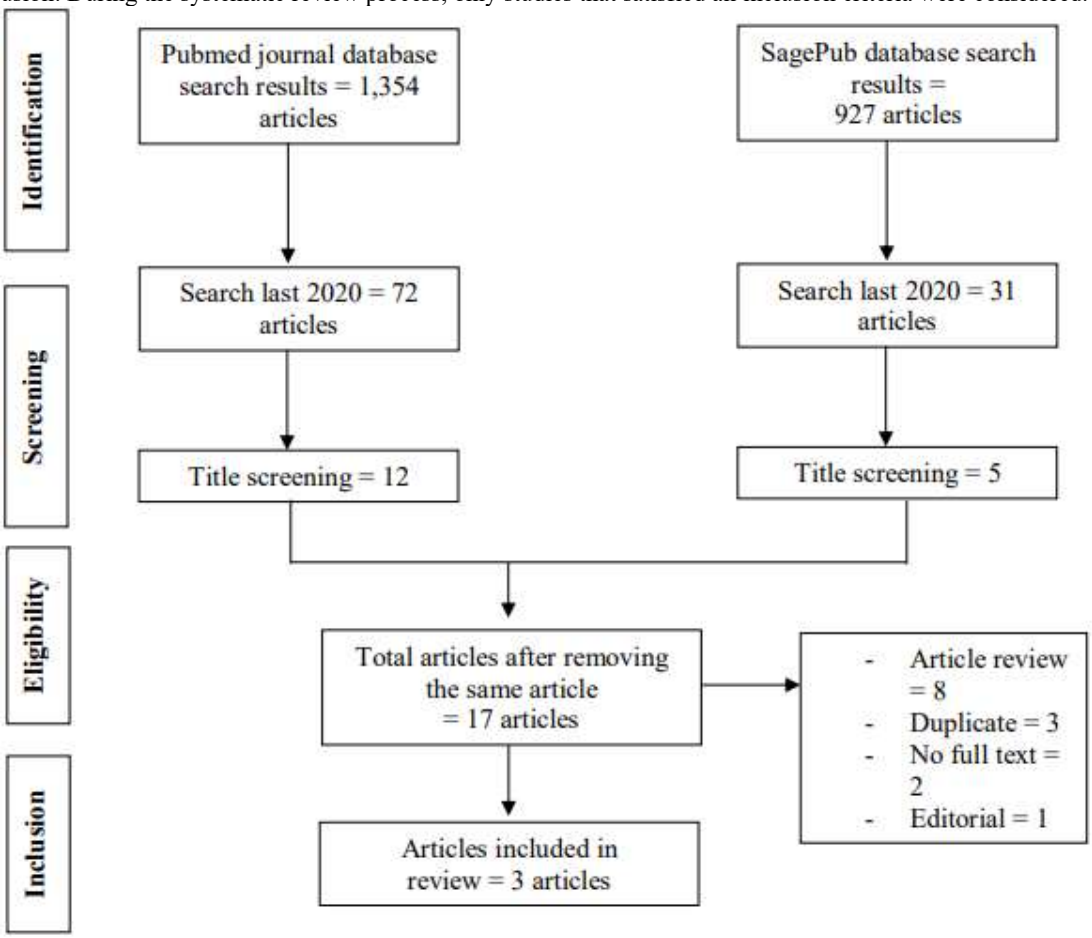

Figure 1. Article search flowchart

This ensured that only relevant information was discovered. We did not consider any research proposals that did not satisfy all of our criteria. This ensured that a comprehensive examination would be conducted. This effort produced data relevant to the studies, including their titles, authors, publication dates, locations, types of research investigations, and parameters. These are the categories of obtainable items. These are abilities that can be cultivated. Among the information sources, these data can be presented in a number of formats.

Quality Assessment and Data Synthesis

Before deciding on which articles to investigate, each author conducted an independent investigation of a piece of research mentioned in the titles and abstracts of the papers. Then, the complete texts of publications that meet the systematic review's inclusion criteria will be reviewed to determine which papers will be included in the review. This will be performed in order to select the articles to be included in the review. In order to simplify the process of selecting articles for the review. Which studies are of sufficient quality to be included in the review?

RESULT

First study consisted of a total of 182 patients, 27.5% of whom were classified as belonging to the group at risk for malnutrition, and 52.7% of whom were classified as having malnutrition. There were statistically significant differences between the three groups in the prevalence of comorbid diabetes mellitus, body mass index (BMI), calf circumference, albumin, and hemoglobin levels, as well as lymphocyte counts. According to the results of further regression analysis, diabetes, having a small calf circumference, and having a low albumin level are all independent risk factors for malnutrition.[4]

Table 1. The litelature include in this study

Author	Origin	Method	Sample Size	Result
Li, 2020[4]	China	Cross sectional study	182 patients with COVID-19	27.5% of 182 patients had malnutrition risk and 52.7% had malnutrition. The three groups had statistically different rates of comorbid diabetes mellitus, BMI, calf circumference, albumin, hemoglobin, and lymphocyte counts. Malnutrition risk factors included diabetes, low calf circumference, and low albumin.
Filippo, 2021[5]	Italy	Post-hoc analysis of a prospective observational cohort study	213 patients with COVID-19	Sixty-one patients (29% of the total, and 31% of hospitalised patients vs. 21% of patients managed at home, p = 0.14) had lost >5% of initial body weight (median weight loss 6.5 [5.0–9.0] kg, or 8.1 [6.1–10.9]%). Patients who lost weight had greater systemic inflammation (C-reactive protein 62.9 [29.0–129.5] vs.48.7 [16.1–96.3] mg/dL; p = 0.02), impaired renal function (23.7% vs. 8.7% of patients; p = 0.003) and longer disease duration (32 [27–41] vs. 24 [21–30] days; p = 0.047) as compared with those who did not lose weight. At multivariate logistic regression analysis, only disease duration independently predicted weight loss (OR 1.05 [1.01–1.10] p = 0.022).
Bedock, 2020[6]	France	Cross sectional	160 patients with COVID-19	The prevalence of moderate malnutrition was 23.7%, while severe malnutrition was 18.4% of the population. Patients who were admitted from the intensive care unit had a prevalence of malnutrition that reached 66.7%. There was no discernible connection discovered between a person's dietary state and the clinical manifestations of COVID-19. Lower albumin levels were linked with a higher probability of transfer to the intensive care unit (OR [95%CI]: 0.31 [0.1; 0.7]; p 0.01), and this association was independent of age and CRP levels. For every 10 g/l of albumin, the OR was 0.31 [0.1; 0.7].

Filippo, et al (2021)[5] conducted a study with sixty-one patients (29% of the total, and 31% of hospitalised patients vs. 21% of patients managed at home, p = 0.14) had lost
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DISCUSSION

Covid-19 is being caused by a severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which is an enveloped single-stranded RNA virus that is a member of the Coronaviridae family and the beta-coronavirus genus. This virus is responsible for the global spread of the disease.[9,10] Analysis of the patient's lower respiratory tract isolates led to the discovery of a new coronavirus, which the World Health Organization (WHO) called Coronavirus Disease 2019 (Covid-19). Acute respiratory syndrome Coronavirus-2 is highly contagious and is the third coronavirus discovered in the past 18 years that can be transmitted between species.[10,11]
This demonstrates that the majority of individuals infected with Covid-19 exhibit no symptoms or recover rapidly, however in other cases, clinical symptoms may continue or develop continually.[12] This respiratory infection was caused by the virus. In clinical practice, there was still a dearth of effective particular pharmacological treatment at the moment, and supportive treatment was still the primary treatment option.[13] Those who were younger or in the middle of their life span had a better prognosis overall than patients who were elderly. One possible explanation is that elderly patients tend to have low nutritional status.[14,15]

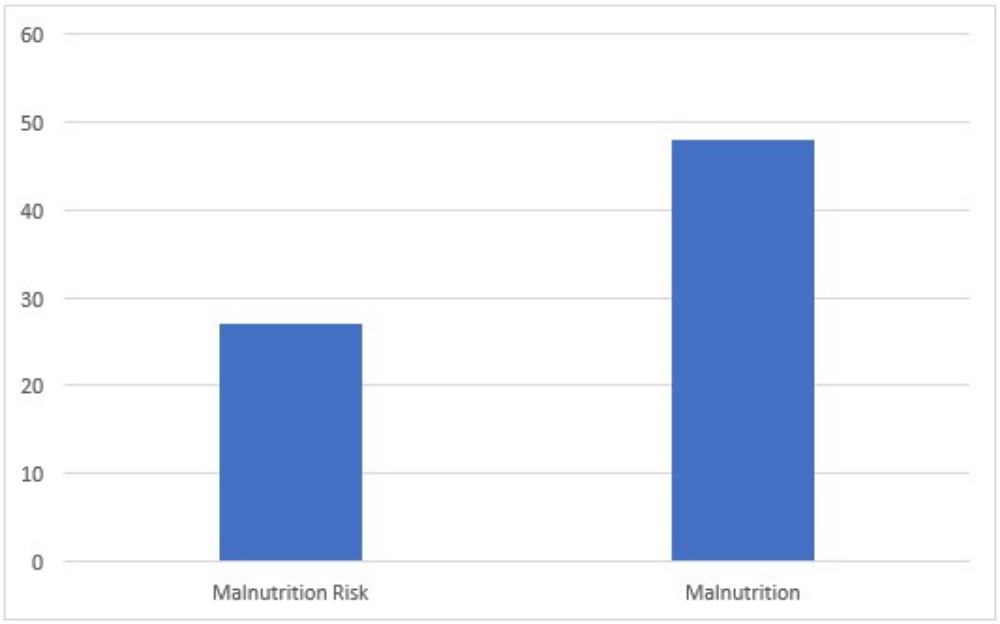

Figure 2. Prevalence malnutrition and malnutrition risk patients with COVID-19

The majority of Covid-19 patients experience mild to severe effects. Approximately 10 to 15% of cases have severe symptoms, and 5% become critical. In many patients, certain symptoms may continue for weeks to months beyond recovery. Also possible in mild situations. The patient is no longer infectious during this phase. Post-Covid-19 consequences varied amongst patients.[16–19] There are still not many clinical studies regarding post-Covid-19 sequelae. There are four frameworks to help identify and diagnose post-Covid 19 manifestations. The identification framework includes 4 screening categories namely laboratory, radiological pathology, decreased functional status and subjective symptoms and quality of life.[20]
According to the findings a cross-sectional study, 27.5% of patients over the age of 65 were at risk of malnutrition, and 52.7% were malnourished; these figures were generally greater than those of senior patients with other disease spectrums.[4,14,15] Malnutrition was a nutritional condition that induced detrimental effects to normal human functioning. Elderly patient groups were more likely to be affected by malnutrition than younger patient groups. The overall incidence of malnutrition in elderly people was found to be approximately 23%, with a 50.5% higher incidence in rehabilitation institutions and a 38.7% incidence in hospitalized patients, according to a study that analyzed and summarized the findings from 12 different countries or regions.[21,22]

Almirall, et al (2017) investigation found a significantly high frequency of malnutrition across the board. Poor nutritional status is a known risk factor for community-acquired pneumonia,[23] and a research conducted in Italy by Russo et al. found that malnutrition was an independent risk factor for hospitalization in patients who had home-acquired pneumonia and lived in long-term care institutions.[24] The prevalence of malnutrition was 40.4% among these hospitalized senior patients with a mean age of 81.5 years, which is close to the data we obtained despite the fact that our cohort was significantly younger. This significant frequency of malnutrition in COVID-19 patients is on the same order of magnitude as the one reported by Li et al. in hospitalized COVID- 19 patients in Wuhan (52.7%).[4]

The elderly patients who were diagnosed with COVID-19 had a significantly greater prevalence of malnutrition.[22] The following is maybe a list of the primary factors. First, the acute inflammatory reaction caused by the neocoronavirus infection consumed the protein that was responsible for the formation of muscles. Indicators of inflammation in patients, such as C-reactive protein, ferritin, tumor necrosis factor alpha, and interleukin family factors, among others, all rose. The consumption of albumin and even protein from muscle was necessary for the creation of these acute-phase proteins.[25]

This was in line with the findings of the study's regression analysis, which indicated this to be true. Both the patient's albumin level and the circumference of their calves were dramatically reduced. In a similar vein, hypoalbuminemia and a low calf circumference were frequently used as significant indications of malnutrition in the past. Second, the comorbidity rate of diabetes mellitus was significantly higher in the older individuals with COVID-19 than it was in the general population. In other words, greater rates of diabetes mellitus as a concomitant condition linked to higher rates of malnutrition in older individuals with COVID-19.[25,26]

Patients suffering from diabetes, as a result of their own internal glandular dysfunction, exhibited problems in their metabolism of the three major nutrients, which was the internal cause of malnutrition. Malnutrition can also be caused by factors that are extrinsic to the body, such as inappropriate nutrient ratios, poor dietary control by diabetic

patients, and other variables. In addition, the inflammatory response brought on by SARS-CoV-2 and the usage of glucocorticoids led to changes in blood glucose, which were associated to the development of the disease.[25]

Patients diagnosed with mild COVID-19 who are treated at home have an increased risk of malnutrition. Changes in smell and taste, as well as exhaustion and a lack of appetite, are noted as relatively prevalent symptoms in COVID-19 patients,[7] which could decrease the amount of food that is consumed. Because to COVID-19 symptoms, patients may be confined to they home, which might reduce the amount of physical activity they do. This can result in a loss of lean mass. Even in individuals who aren't being treated in hospitals, malnutrition could develop as a consequence of these causes and a systemic inflammatory response.[8]

Third, the gastrointestinal symptoms brought on by SARS-CoV-2 in elderly patients made their already severe malnutrition even worse. Additionally, high levels of angiotensin-converting enzyme 2 expression were found in the gastrointestinal tract. Therefore, the digestive system was the primary area of emphasis for the SARS-CoV-2 infection. In the clinical setting, older patients with COVID-19 typically presented with the greatest number of gastrointestinal symptoms in addition to respiratory symptoms. It was highly usual for patients to experience diarrhea, minor stomach pain, nausea, vomiting, decreased appetite, and other symptoms.[25]

Other potential contributors to weight loss and an increased risk of malnutrition in they group include medical treatments and mechanical breathing in hospitalized patients. These factors were not specifically evaluated, although they may have played a role. A decrease in the desire or motivation to eat may result from negative emotions such as fear and grief. In patients who are managed at home, confinement may restrict patients' access to food and/or the variety of dietary choices available to them. This, like a vicious circle, is a source of irritation, anxiety, and rage, in addition to having direct repercussions for the patients' nutrition.[27,28]

CONCLUSION

COVID-19 could have a negative impact on body weight and nutritional status. Nutritional evaluation, counseling, and treatment should be implemented in COVID-19 patients at the initial assessment, throughout the course of disease, and after clinical remission.

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