REVISIONES

Outcomes and clinical characteristics of people with obesity and covid-19: integrative review

Desfechos e características clinicas de pessoas com obesidade e covid-19: revisão integrativa

Resultados y características clínicas de personas con obesidad y covid-19: revisión integrativa

Francisco João de Carvalho Neto[1]
Brenda Moreira Loiola[2]
Vitória Eduarda Silva Rodrigues[3]
Laelson Rochelle Milanês Sousa[4]
Ana Luiza Negreiros[4]

[1] Nurse. Master's student in nursing at the Federal University of Piauí; Member of the Collective Health Research Group - UFPI / CNPq (Picos, PI, Brazil). franciscojoaodecarvalhoneto@gmail.com
[2] Nurse. Federal University of Piauí; Member of the Collective Health Research Group - UFPI / CNPq (Picos, PI, Brazil).
[3] Nurse. Resident in high complexityat the Federal University of Piauí; Member of the Collective Health Research Group - UFPI / CNPq (Picos, PI, Brazil).
[4] Nurse. Professor at the Nursing Department at the Federal University of Piauí (Picos, PI, Brazil).

ABSTRACT:
Objective: To identify people's outcomes and clinical characteristics of those with obesity and covid-19 in the national and international scientific literature.
Method: Integrative Review, in which it aimed to answer the guiding question: What are the clinical characteristics presented by people with obesity with a confirmed diagnosis of COVID-19, and its impact on health?" indexed in the database Medical LiteratureandRetrivial System on Line, and Virtual Health Library in November 2020.
Results: Out of the 13 articles analyzed in total, all were published in international journals; in the year 2020, concerning clinical outcomes, a high mortality rate was evidenced in patients admitted with covid-19 who had obesity in comparison with those without obesity, more extended hospital stay, need for oxygen therapy, increased severity of Covid-19 disease, a risk factor for morbidity rates in younger people, being able to predispose to risk of more severe conditions and influence the progression and prognosis of the disease. Regarding the clinical characteristics, they showed that ferritin tended to remain higher in the group of obese people, being more likely to have fever, cough, and shortness of breath.
Conclusion: Obesity in people with covid-19 potentiates clinical characteristics such as cough, fatigue, fever, and tiredness. Clinical outcomes include the potential risk of complications, high mortality rates,

greater propensity to be intubated, longer oxygen therapy time. Thus, more attention should be paid to these patients by the health teams.

Keywords: Obesity; Covid-19; clinical features.

RESUMO:
Objetivo: Identificar os desfechos e características clínicas de pessoas com obesidade e covid-19 na literatura científica nacional e internacional.
Método: Revisão Integrativa, na qual visou responder à questão norteadora: "Quais as características clínicas apresentadas por pessoas com obesidade com diagnóstico confirmado de COVID-19, e sua repercussão para a saúde?" indexadas na base de dados *Medical Literature and Retrivial System on Line* e Biblioteca Virtual de Saúde no mês de novembro de 2020.
Resultados: Dos 13 artigos analisados na íntegra, todos foram publicados em periódicos internacionais, no ano de 2020, em relação aos desfechos clínicos evidenciou-se alta taxa de mortalidade nos pacientes admitidos com covid-19 que tinham obesidade em comparação com aqueles sem obesidade, maior tempo de permanência hospitalar, necessidade de oxigenoterapia, aumento da gravidade da doença do Covid-19, fator de risco para as taxas de morbidade em pessoas mais jovens, podendo predispor a risco de doenças mais graves e influenciar na progressão e o prognóstico da doença. A respeito das características clínicas, demonstraram que a ferritina tendeu a permanecer mais elevada no grupo de pessoas obesas, sendo mais propensos a apresentar febre, tosse e falta de ar.
Conclusão: A obesidade em pessoas com covid-19 potencializa as características clinicas como tosse, fadiga, febre e cansaço. Ademais, tem como desfechos clínicos o potencial risco de complicações, altas taxas de mortalidade, maior propensão a serem intubados, maior tempo de oxigenoterapia. Assim, mais atenção deve ser dispensada a esses pacientes por parte das equipes de saúde.

Palavras-chave: Obesidade; Covid-19; Características clínicas.

RESUMEN:
Objetivo: Identificar los resultados y las características clínicas de las personas con obesidad y covid-19 en la literatura científica nacional e internacional.
Método: Revisión Integrativa, en la que tuvo como objetivo dar respuesta a la pregunta orientadora: "¿Cuáles son las características clínicas que presentan las personas con obesidad con diagnóstico confirmado de COVID-19, y su impacto en la salud?" indexados en la base de datos Medical Literature and Retrivial System on Line, y Virtual Health Library en noviembre de 2020.
Resultados: De los 13 artículos analizados en su totalidad, todos fueron publicados en revistas internacionales, en el año 2020, en relación a los resultados clínicos, se evidenció una alta tasa de mortalidad en pacientes ingresados con covid-19 que presentaban obesidad en comparación con aquellos sin obesidad, estancia hospitalaria más prolongada, necesidad de oxigenoterapia, aumento de la gravedad de la enfermedad Covid-19, factor de riesgo para las tasas de morbilidad en personas más jóvenes, pudiendo predisponer al riesgo de enfermedades más graves e influir en la progresión y pronóstico de la enfermedad . En cuanto a las características clínicas, mostraron que la ferritina tendía a permanecer más alta en el grupo de personas obesas, siendo más propensas a tener fiebre, tos y dificultad para respirar.
Conclusión: La obesidad en personas con covid-19 potencia características clínicas como tos, fatiga, fiebre y cansancio. Además, los resultados clínicos incluyen el riesgo potencial de complicaciones, altas tasas de mortalidad, mayor propensión a intubar, mayor tiempo de terapia de oxígeno. Por tanto, los equipos sanitarios deberían prestar más atención a estos pacientes.

Palabras llave: Obesidad; Covid-19; Características clínicas.

INTRODUCTION

The disease caused by the new coronavirus (severe acute respiratory syndrome coronavirus 2, SARS-CoV-2), enveloped RNA viruses, commonly found in humans, demonstrates a broad spectrum of severity and lethality in patients with no apparent symptoms. These and other factors contributed to its rapid spread globally and its configuration in a pandemic [1].

The impact of the chaos that this pandemic has presented can be demonstrated by the number of people infected and the number of deaths already registered. Considering the official records so far (11/11/2020), 51,251,715 cases of COVID-19 and 1,270,930 deaths have been confirmed worldwide. And in the Region of the Americas, 14,387,350 people who were infected with the new coronavirus were recovered from the disease. Brazil had a total of 5,224,362 confirmed cases of coronavirus [2].

The spectrum of the disease is broad and includes mild and self-limited conditions up to severe and progressive atypical pneumonia, multiple organ failure, and death. The people who have characteristics prone to develop more severe forms of the disease and with a higher risk of death are the elderly, diabetics, or those with cardiovascular, respiratory, or kidney diseases[3].

Another population at increased risk of developing more severe forms of the disease is people with obesity. Such morbidity can be defined, in a simplified way, as a disease characterized by excessive accumulation of body fat due to the positive energy balance and which has repercussions on health, with a significant loss in quality and time of life [4].

People who have this disease can develop severe forms of COVID-19, which may present a decrease in lung function, changes in the microbiota, an increase in pro-inflammatory substances, and changes in the immune response[5], constituting a severe risk for hospitalization[6].

The unfavorable effects of obesity in viral infections have been attributed to metabolic breakdown and chronic inflammation of fatty tissue deposits, leading to blunted macrophage activation and impaired T and B lymphocyte responses[7].

Given the above, this study is justified by the need to have a more in-depth approach concerning the clinical characteristics and outcomes in people with covid-19 and obesity, allowing particular attention for this public, both on the part of health professionals public health policies. Considering that patients with obesity have a decisive predictive factor for the worsening of the clinical conditions of covid-19, and also due to the scarcity in the national literature on the subject, the present study aimed to identify the outcomes and clinical characteristics of people with obesity and covid- 19 in national and international scientific literature.
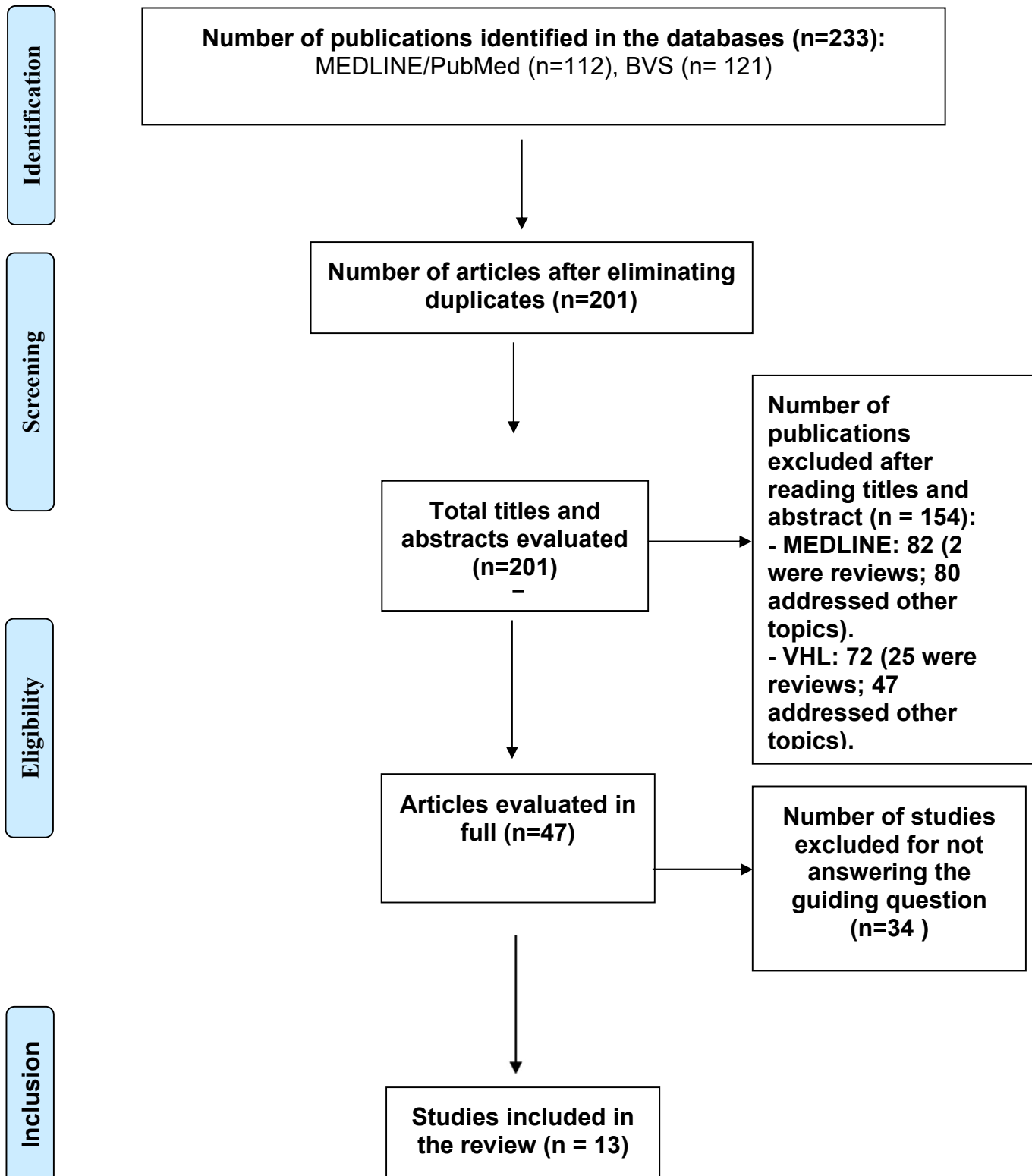
METHOD

It is an Integrative Literature Review, a method that has the following steps: 1) elaboration of the review question; 2) search and selection of primary studies; 3) extraction of data from the studies; 4) critical evaluation of the primary studies included in the review; 5) synthesis of the results of the review and 6) presentation of the method[8].

The research question was formulated according to the acronym PICo (P - Population; I - Phenomenon of Interest; Co - Context[9] and the following structure was considered: P - people with obesity; I - clinical characteristics; Co - in COVID-19 times. Thus, the next question was asked: "What are the clinical characteristics presented by people with obesity with a confirmed diagnosis of COVID-19 and its impact on health?"

The strategy for identifying and selecting the studies was to search for publications indexed in the Medical Literature and Retrieval System on Line database (MEDLINE / PubMed®), and Virtual Health Library (VHL) in November 2020, with the descriptors in health sciences (DeCS): obesity, covid-19, and clinical characteristics, using among them the Boolean operator and. The following criteria were adopted to select articles: original articles in total, available online in the selected databases, and published in Portuguese, English, and Spanish, with a time frame from 2019 to 2020. Review articles, theses, dissertations, non-scientific materials, or papers that were not related to the theme and those duplicated in the databases.

Out of the material obtained, there were 121 articles in the VHL, after the exclusion of the repeated ones, 90 articles remained. In MEDLINE there were 112 articles, one being repeated. Each abstract/article was read, highlighting those that responded to the objective proposed by this study to organize and tabulate the data. For the organization and tabulation of data, the researchers developed a data collection instrument containing: names of authors, year of publication, country of study, category of research, study population, results, and conclusion. Following the inclusion criteria, studies were selected for a complete evaluation, with 13 chosen for characterization.

Figure 1: Flowchart of study selection according to PRISMA. Picos, Piauí, Brazil, 2020

Identification	Number of publications identified in the databases (n=233): MEDLINE/PubMed (n=112), BVS (n= 121)
Screening	Number of articles after eliminating duplicates (n=201)
Eligibility	Total titles and abstracts evaluated (n=201) → Number of publications excluded after reading titles and abstract (n = 154): - MEDLINE: 82 (2 were reviews; 80 addressed other topics). - VHL: 72 (25 were reviews; 47 addressed other topics).
	Articles evaluated in full (n=47) → Number of studies excluded for not answering the guiding question (n=34)
Inclusion	Studies included in the review (n = 13)

RESULTS

Of the 13 articles analyzed in total, all were published in international journals, most of which were conducted in the United States (n = 5), followed by China (n = 4), all in 2020. Regarding the method adopted in the surveys, retrospective cohorts predominated.

The publications covered the outcomes and clinical characteristics of COVID-19 in patients with obesity, mostly the context of the health service that the surveys were developed, hospitals predominated, with samples ranging from 65 to 383 participants.

Chart 1: Summarization of the descriptive characteristics of the articles included (n = 13). Picos, PI, Brazil, 2020.

AUTHORS, YEAR AND COUNTRY	OBJECTIVE	DESIGN / PARTICIPANTS	MAIN RESULTS	CONCLUSION
Moriconi,et al, 2020, Italy.	Investigate whether obesity affects COVID-19.	Observational study of 100 consecutive patients with pneumonia and COVID-19 admitted to a Medical Unit.	Obese patients had a more extended period of time to achieve oxygen sperm, resulting in a longer hospital stay. In any case, at discharge, no difference was found in the level of C-reactive protein (CRP), while ferritin tended to remain higher in the group of obese people.	There was a long time of hospitalization and hospitalization and treatment with prolonged oxygen in obese patients.
Simonnet,et al,2020, France.	To investigate the association between BMI and clinical characteristics if the need for invasive mechanical ventilation in patients admitted to intensive care for SARS-CoV-2.	Retrospective cohort study with 124 patients admitted to Intensive care with SARS-CoV-2 at a French center.	It was observed that obesity (BMI 30 kg/m2) and severe obesity (BMI 35 kg / m2) were present in 47.6% and 28.2% of cases, respectively. The need for invasive mechanical ventilation increased in people with BMI greater than (30 kg/m2) the BMI categories, regardless of age, diabetes, and hypertension.	There was a high frequency of obesity among patients admitted to intensive care by SARS-CoV-2, and the severity of the disease increased with high BMI.
Lighter et al., 2020, USA.	To identify whether obesity in patients under 60 years of age is a risk factor for hospitalization due to COVID -19.	Retrospective study of stratified BMI with patients <60 years old, positive for Covid-19 with intensive care in an academic hospital system.	Patients <60 years of age with a BMI between 30-34 were 2.0 (p <0.0001) and 1.8 (p = 0.006) times more likely to be admitted to acute and critical care, respectively, compared to individuals with BMI <30. Similarly, patients with BMI> 35 and aged <60 years were 2.2 (p <0.0001) and 3.6 (p = <0.001) times more likely to be admitted to care compared to patients in the same age group who had a BMI <35.	Obesity in people <60 years is a newly identified epidemiological risk factor that can increase morbidity rates in the USA.

Palaiodimos,et al., 2020. USA.	To evaluate the characteristics and initial results of patients hospitalized with COVID-19 in The Bronx investigates whether obesity is associated with worse outcomes, regardless of age, sex, and other comorbidities.	Retrospective cohort conducted with 200 patients.	Of the cohort, 24% died during hospitalization, with higher rates among individuals with severe obesity. Similarly, patients with severe obesity were more likely to be intubated p = (0.032). In total, 45% of patients had increased oxygen during care during hospitalization.	Severe obesity was associated with higher hospital levels and mortality. Obese patients diagnosed with COVID-19 should be treated with particular attention given the possible risk of adverse results.
Huang et al., 2020, Australia.	Report clinical characteristics of a patient with obese and Covid-19 Hypoventilation Syndrome.	Case report of a 23-year-old man seen at the Central Hospital of Wen-Zhou, Wenzhou, China, positive for SARS-CoV-2 and other medical comorbidities including metabolic associated with fatty liver disease and BMI 37.3 kg/m^2.	The patient had acute respiratory failure type II. The most relevant clinical findings included a body mass index (BMI) of 37.3 kg / m 2 and body temperature of 39.4 ° C, C-reactive protein (CRP) of 37.8 mg / ferritin of 796 µg / L, lactate of 2.2 mmol / L and PaO 2 / FiO 2 of 205 mm Hg. Chest tomography showed bilateral ground-glass opacities. The patient's PaCO2 levels remained elevated despite several attempts to adjust his oxygenation therapy.	Obesity with COVID-19 may predispose patients to the risk of more serious diseases such as obese hypoventilation syndrome.
Bello-Chavolla et al. 2020, Mexico.	Investigate specific risk factors associated with COVID-19 positivity and mortality and explore the impact of diabetes and obesity in modifying COVID-19-related lethality.	We obtained data on confirmed and negative COVID-19 cases and their demographic and health characteristics from the General Directorate of Epidemiology of the Ministry of Health of Mexico.	Confirmed cases of COVID-19 with obesity had higher rates of mortality, ICU admission and were more likely to be intubated.	Obesity is a specific risk factor for COVID-19 for mortality and increased severity of the disease.
Cai et al.,2020. China	Examine the association of obesity with the severity of COVID-19.	Study with 383 patients hospitalized with COVID-19.	Obese patients tend to have more pronounced symptoms such as coughing (P = 0.03) and fever (P = 0.06) compared to non-obese patients. Also, they were likely to develop severe COVID-19.	Obese patients had an increased chance of progressing to severe COVID-19.
Tartof et al., 2020. USA.	Determine the adjusted effect of BMI, associated comorbidities, time, neighborhood-level sociodemographic factors, and other factors on the risk of death from COVID-19.	Retrospective cohort with 206 patients.	There was a strongly significant association between high BMI and the risk of death.	Obesity plays a profound role in the risk of death from COVID-19.

Hajifathalian et al., 2020. USA.	To raise the hypothesis that obesity may play a role in the clinical course of patients with COVID 19.	Retrospective study	Obese patients were more likely to experience fever, cough, and shortness of breath. Obesity was also associated with a significantly higher rate of ICU admission or death (p = 0.002).	Obese patients had an increased risk of critical illness leading to ICU admission or death than normal-weight individuals.
Wang et al., 2020. China.	Observe the clinical characteristics of overweight and obese patients with COVID-19.	COVID-19 patients from 10 hospitals in Jiangsu province.	The proportions of bilateral pneumonia, type 2 diabetes, and severe illness were higher in patients with obesity than in lean patients. They developed more respiratory failure and acute respiratory distress syndrome. The hospital stay was longer.	Overweight and obesity were independent risk factors for severe disease in patients with COVID-19.
Deng et al., 2020. China.	To explore the severity indicators of coronavirus 2019 (COVID-19) in young patients aged between 18 and 40 years.	The retrospective cohort included 65 patients admitted with COVID-19.	All patients with severe/critical cases were overweight/ obese. They had a low serum albumin level, high direct bilirubin levels, lipoprotein, and C-reactive protein. Also, the neutrophil count was higher.	Obesity is an important predictor of the severity of COVID-19 in young patients. The main mechanism is related to liver and kidney damage.
Steinberg, Wright, Kushner. 2020. USA.	Identify whether adverse outcomes are associated with obesity, particularly in patients with COVID-19 aged 45 or younger.	The retrospective cohort of two centers included 210 patients.	They died during hospitalization (9%), 35 (17%) required mechanical ventilation, and 94 (45%) were admitted to the hospital.	Obesity appears to be an independent risk factor for poor outcomes in young patients with COVID-19.
Kang et al., 2020. China.	Find out if obesity is a risk factor that influences the progression and prognosis of COVID-19.	Retrospective single-center study with 95 patients hospitalized with COVID-19 at Wuhan Union Hospital.	Obese patients had a high mortality rate compared to those without obesity. Besides, patients with obesity also demonstrated more severe pathological changes in the lung and upper blood lymphocytes, triglycerides, IL-6, CRP, cystatin C, alanine aminotransferase, erythrocyte sedimentation rate.	Obesity contributes to clinical manifestations and can influence the progression and prognosis of COVID-19 and is considered a potential risk factor for the prognosis of COVID-19.

DISCUSSION

Regarding the origin of the surveys, it is noted that all were done in other countries. Most studies have been published in the USA referring to the clinical situation of the population since they live in an obesity epidemic. They were followed by China, where the coronavirus appeared, in 2019.

Regarding the objectives of the studies, four articles investigated the clinical characteristics of people with covid-19 and obesity, three the risk factors of people with covid-19 and obesity, and the others the severity of people with covid-19 and obesity. Regarding the type of study, eight articles were from a retrospective cohort.

Recent studies have shown a strong association of worse clinical outcomes in COVID-19 disease with obesity, even in the absence of any other comorbidity. A unicentric French study found that obesity was present in 47.6% and 28.2% of severe cases, respectively. Simultaneously, the need for interventional mechanical ventilation increased with the categories of BMI, regardless of age, diabetes, and hypertension[10].

Obesity influences clinical outcomes during SARS, being proposed as a cause of mortality and adverse clinical outcomes for severe cases of influenza due to mechanical and immunological factors. In cases of COVID-19, obesity was consistently associated with adverse outcomes[11], with the comorbidity that conferred an increased risk of death exclusively for COVID-19 compared to non-COVID-19[12].

In addition to the harmful effects on host immunity, in the context of the disease by the new coronavirus, obesity has been shown to affect lung function in several ways, related to the mechanical and inflammatory aspect, increased expression of ACE2 (angiotensin-converting enzyme 2), increased diversity and viral titers and prolonged virus elimination[13], reduction in expiratory volume and forced vital capacity[5]. Thus, it makes the person with obesity more susceptible to presenting respiratory symptoms and promoting progression to respiratory failure[14].

Such morbidity systematically induces chronic inflammation by increasing the secretion of cytokines, such as interleukin 6 (IL6), interleukin 8 (IL8), and tumor necrosis factorα, which can aggravate the damage to the lung parenchyma and bronchi[15]. This inflammation in obesity can worsen the acute inflammatory response triggered by a SARS-CoV-2 infection, associated with a cytokine release syndrome[16].

Regarding the evidenced clinical outcomes, a study showed a high mortality rate in patients admitted with covid-19 who were obese compared to those without obesity and longer hospital stay[17]. Another study revealed a higher admission rate to the ICU in obese people than those without obesity[18]. Another finding was longer oxygen therapy time, increased severity of covid-19 in people with obesity[12].

A study carried out with young people showed that obesity is a risk factor for morbidity rates in younger people, predispose to risk of more serious diseases and influence the progression and prognosis of COVID-19[19].

Regarding the clinical characteristics mentioned in this research, they demonstrated that ferritin tended to remain higher in the group of obese people. These patients were more likely to have fever, cough, and shortness of breath, low serum albumin level, high levels of direct bilirubin, lipoprotein, and C-reactive protein (CRP). The neutrophil count was also higher and showed more severe pathological changes in the lung and upper blood lymphocytes, triglycerides, IL-6, CRP, cystatin C, alanine aminotransferase, erythrocyte sedimentation rate[20].

The characteristics mentioned above are due to low-grade chronic inflammation that characterizes obesity and results in metabolic and immunological disorders. As the pathophysiology of SARS-CoV-2 infection is being clarified, the links between the severity of the clinical presentation and the dysmetabolic background are revealed. Dysfunctional hypertrophic adipocytes in obesity produce an excessive amount of cytokines, such as IL-6, IL-8, monocyte-attracting protein-1, leptin, and plasminogen activator inhibitor-1 (PAI -1), among others, which leads to increased recruitment of macrophages, especially polarized M1 macrophages[20].

These cells, in turn, produce large amounts of pro-inflammatory molecules such as IL-1, IL-6, IL-8, TNF, and MCP-1. This effect is also enhanced by the action of increasing circulating levels of fatty acids free. The cumulative effect of these actions is a state of chronic inflammation and hypercytokinaemia, which leads to defective innate immunity and creates a favorable basis for the hyperinflammatory response mediated by macrophage activation syndrome in severe COVID-19 cases[21].

Given the articles selected for review, it becomes evident that obesity together with covid-19 hinders is a potential risk factor for worsening prognosis, the evolution of the patient's cure, and even death. Thus, it needs treatment with specialized care for such an audience.

CONCLUSION

It was found that obesity in people with covid-19 is an important predictor of severity, enhancing clinical characteristics such as cough, fatigue, fever, and tiredness. Also, clinical outcomes include the potential risk of complications, high mortality rates, greater need for admission to the ICU, greater propensity to be intubated, and longer oxygen therapy time. Thus, more attention should be paid to these patients by health teams, from admission to discharge.

As a recommendation, it is essential to make the general population aware of the severity of covid-19 in people with obesity so that preventive measures are enhanced, and contamination among this public is reduced to the maximum possible. Given the importance of the subject, it is necessary to carry out more studies, mainly national, since none was identified in the research, to investigate the clinical characteristics and outcomes of people with obesity and covid-19 for a better knowledge of which intervention is safer and more effective in the face of this situation.

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