


Original Article

Evaluation of Nutritional Risk and Prevalence of Obesity in Patients with Covid-19 in A Reference Hospital in Salvador, Bahia, Brazil: A Cross-Sectional Study

Avaliação do risco nutricional e prevalência de obesidade nos pacientes com Covid-19 em um hospital de referência em Salvador, Bahia, Brasil: Estudo transversal

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Abstract

Introduction The Coronavirus has spread to almost every country in the world, causing the coronavirus disease (COVID-19). The coronavirus stands out among the other infections especially by its high contagious power and important effects on the respiratory system. The COVID-19 has different ways of presentation and these are influenced by the patient's previous nutritional status, correlated with the patient's lifestyle and comorbidities.

Objective this survey seeks to analyze the nutritional status and the prevalence of obesity in patients hospitalized with SARS-CoV-2. **Methods:** this is a descriptive, prospective and cross-sectional study type, which 41 patients affected by COVID-19 were interviewed. Patient's weight and height were used to assess the BMI, and nutritional risk assessment was performed using the Nutritional Risk Screening tool (NRS 2002). For the analysis, Absolute (AF) and Relative Frequency (RF), the mean and the standard deviation were calculated.

Keywords

- ▶ Coronavirus Infections
- ▶ Obesity
- ▶ Nutritional Status
- ▶ Risk Factors
- ▶ Epidemiology

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Resumo

Results It was observed that 78% of the participants had a high nutritional risk, while only 22% had a low nutritional risk. Besides that, 34% showed overweight and 41.4% showed obesity.

Conclusion the existence of a high prevalence of increased nutritional risk was evidenced, in addition to the high frequency of overweight in patients affected by SARS-CoV-2.

Introdução O coronavírus se espalhou por quase todos os países do mundo levando pacientes a apresentarem a Doença do Coronavírus (COVID-19). Essa doença em questão destaca-se das demais especialmente pelo seu alto poder contagioso associado a efeitos importantes sobre o sistema respiratório. O COVID-19 tem diferentes espectros de apresentação que são influenciados pelo estado nutricional prévio do paciente, correlacionando-se assim diretamente com o seu estilo de vida e comorbidades.

Objetivo Este estudo tem como objetivo analisar o estado nutricional de pacientes hospitalizados com a SARS-CoV-2, bem como a prevalência de obesidade nesses pacientes.

Métodos O presente estudo é do tipo descritivo, prospectivo e de corte transversal, onde foram entrevistados 41 pacientes acometidos pela COVID-19. Utilizou-se do peso e altura dos pacientes para avaliar o IMC, e a avaliação do risco nutricional foi realizada através da ferramenta *Nutritional Risk Screening* (NRS 2002). Para a análise dos dados, foram calculados a frequência absoluta (AF) e relativa (RF), a média e o desvio padrão.

Resultados Observou-se que 78% dos participantes apresentaram alto risco nutricional, enquanto apenas 22% estavam com baixo risco nutricional. Além disso, 34% dos pacientes apresentaram sobrepeso e 41,4% dos pacientes apresentaram obesidade.

Conclusão Evidenciou-se a existência de uma grande prevalência de alto risco nutricional, além da frequência elevada de excesso de peso nos pacientes acometidos pelo SARS-CoV-2.

Palavras-chave

- ▶ Infecções por Coronavírus
- ▶ Obesidade
- ▶ Estado Nutricional
- ▶ Fatores de Risco
- ▶ Epidemiologia

Introduction

Coronaviruses are viruses of the family *Coronaviridae*, of the order *Nidovirales*, characterized by being enveloped, having as genetic material RNA. They usually infect humans and other mammals.¹ Most coronavirus infections are mild, with only the Severe Acute Respiratory Syndrome-related Coronavirus (SARS-CoV) and Middle Eastern Respiratory Syndrome (MERS-CoV) epidemics as episodes that have caught attention in recent years.^{2,3}

However, in hospitals in Wuhan City, China, a new coronavirus was isolated and identified in the respiratory tract of patients with unknown origin pneumonia in December 2019.⁴ Initially known as 2019-nCoV, now called Severe Acute Respiratory Syndrome-related Coronavirus 2 (SARS-CoV-2), the new virus has spread to almost every country in the world, causing Coronavirus Disease 2019 or COVID-19.¹ The disease draws attention and differs from other epidemics mainly due to the higher rate of contagion associated with marked effects on the respiratory system.⁵

COVID-19 is transmitted primarily through contact between people or contact with nasal or oral particles

of infected people.⁶ One of the major challenges in combating this disease relies in the evidence that recovered patients can maintain positive viral detection test continuously, and due to this fact, the virus has become a challenge for prevention and control measures.⁷ The mean incubation time of SARS-CoV-2 is estimated at 5 days and the potential for transmissibility varies over the course of the disease.⁸

COVID-19 is an infectious disease with different spectra of presentation, composed of asymptomatic people; individuals with mild to medium symptoms with recovery in a few weeks (80% of cases); patients in serious to critical conditions; and people that progress to death (less than 3% of all cases).⁷ Such courses of the disease are greatly influenced by the patient's precondition, as well as their age and associated comorbidities.⁵

Since the beginning of the study of SARS-CoV-2 and the main factors related to the severity of the condition, different researches conducted worldwide has shown that obesity, Diabetes Mellitus (DM) and hypertension are among the main comorbidities present in patients hospitalized with COVID19, and these conditions are also related to more

severe forms of presentation of the disease and death in these individuals.⁹

Obesity is the state resulting from accumulation of fat tissue, indicated by a Body Mass Index (BMI) ≥ 30 kg/m², due to the positive energy balance; it may occur at any age, with high potential to be harmful to health.¹⁰ In this context, it is possible to correlate obesity with prognostic worsening in COVID-19, mainly due to its chronic inflammatory characteristic. Obesity leads to T cell dysregulation and cytokine growth, which also undergo important changes during SARS-CoV-2 infection.¹¹

After the 2009 H1N1 virus pandemic, obesity had already been recognized as an independent risk factor for influenza complications, due to obese patients remaining with significantly longer viral transmission potential than those without obesity. Thus, obesity is likely to be an independent risk factor also for COVID-19.¹²

In addition, adipose tissue can serve as a viral reservoir, which contributes to predisposition to infection. Obesity is a disease with potential for changes in pulmonary, autonomic and metabolic function, conditions that increase by themselves the risk of Non-Communicable Chronic Diseases (NCCD), which may lead to prognostic worsening in COVID-19.^{13,14}

Studies conducted in Europe and China indicate that patients with severe evolution with ICU stay had a higher mean Body Mass Index (BMI) than those with mild forms of the disease.¹⁵ This can be explained due to the various mechanisms that obesity impacts the immune system, with cardiac overload and immune dysregulation. These are aggravated by insulin resistance, increased in C-reactive protein and reduced β cell function in obesity, limiting the ability to evoke an appropriate response metabolism to the immune challenge.¹⁶

Moreover, a nutritional status of risk and hyperglycemia aggravate the situation of obese individuals. It is also worth mentioning other factors related to the clinical worsening of COVID-19 and greater predisposition to the disease, such as: male gender, advanced age, and low lean mass.¹⁶ However, despite the clear recognition that the presence of comorbidities such as hypertension, DM and cardiovascular diseases (CVD) is associated with a worsening of COVID-19, obesity and the relationship with higher BMI rates have not yet been widely investigated so far.¹⁷

Given the scientific knowledge about the metabolic damage and immunological regulation that obesity and the presence of nutritional risk bring to health and the dimensions that the COVID-19 pandemic has taken, it is imperative to investigate the impact that the nutritional status and lifestyle of the individual have on immunological regulation. Therefore, this study aims to evaluate the nutritional risk and estimate the prevalence of obesity in patients infected with COVID-19.

Methodology

This is a descriptive, prospective, quantitative, and cross-sectional study. We interviewed 41 patients affected by

COVID-19 admitted to a hospital specialized in the treatment of SARS-CoV-2 infection in the city of Salvador, Bahia, Brazil.

We included adult patients aged between 18 and 65 years old, diagnosed with COVID-19 by molecular examination (RT-PCR), with previous gastrointestinal tract, using an oral diet and who were not on mechanical ventilation or requiring ICU stay. We excluded from the study pregnant women; people who have undergone the use of artificial nutrition in the 15 days prior to inclusion in this study; individuals with hyperglycemia (>180 mg/dl) or severe hypertriglyceridemia (>400 mg/dl); or with previous gastrointestinal diseases (surgical resections, malabsorption syndromes, inflammatory bowel diseases, persistent paralytic ileus, upper gastrointestinal bleeding, or severe acute pancreatitis); or with states of immunosuppression defined by neutropenia, myelodysplastic syndromes, congenital immunodeficiency or Acquired Immunodeficiency Syndrome (AIDS), immunosuppressive therapies in the last 3 months, systemic chemotherapy in the last 03 months, autologous bone marrow transplantation in the last year, halogen bone marrow transplantation in the past 02 years, or existence of graft versus host disease; people with advanced chronic diseases (Child-Pugh stage C, heart failure stage IV (NYHA), chronic pulmonary failure functional stage IV, terminal degenerative neurological processes, neoplasia in remission or in progression undergoing treatment); or with processes with short life expectancy including end-stage chronic kidney disease; with acute processes that determine small survival as shock of any etiology with multiple organ dysfunction refractory to therapy in the first 48h or post-cardiopulmonary resuscitation with severe neurological damage within 72h.

Nutritional Risk Screening (NRS 2002) was used to assess nutritional risk.¹⁸ The cutoff point below 3 points was adopted to consider as low nutritional risk and above or equal to 3 as high nutritional risk.

In addition, all participants were weighed and had their heights recorded. The participant remained barefoot and wearing light clothing, being positioned in the center of the scale, in an upright position, with the weight distributed on both feet. Body weight was recorded in kg, with three digits (00.0 kg), immediately after reading. For the height recording, the participant was positioned barefoot, with the head free of props, erect, with the arms extended along the body, head held high, looking at a fixed point at eye-height, in a stadiometer. Height was recorded in meters, using three digits (0.00 m).

Overweight was considered by BMI and classified according to the World Health Organization (WHO) as: without excess weight (BMI < 25.0 kg/m²) and overweight (BMI ≥ 25.0 kg/m²).

For the analysis of categorical variables, Absolute (AF) and Relative Frequency (RF) were calculated. For the continuous variables, the mean and the standard deviation were calculated. Statistical analysis was developed using Microsoft Excel[®] software, Windows[®], version 2019.

At all stages of the research, Resolution 466/2012 on research involving human beings was respected. All participants included accepted the Informed Consent Form (ICF).

The results of this work are part of the Clinical Trial in course called “Effects of Oral Supplementation with Immunonutrients in the Inflammatory Response in Patients with COVID-19” that was approved by the Research Ethics Committee of the State University of Bahia (UNEB) under CAAE No. 31801820.0.0000.0057 and opinion no. 4,031,187. The clinical trial was also registered in the Brazilian Registry of Clinical Trials (REBEC) under UTN No. U1111-1252-3270.

Results

The characteristics of the participants are presented in ►Table 1. A total of 41 patients were evaluated. The mean age of the sample was 45.7 (\pm 12.4) years old.

It was observed that 9 (22.0%) participants had a low nutritional risk after analysis by NRS 2002, while 32 (78.0%) participants were at high nutritional risk.

Discussion

The development of this research allowed the evaluation of the nutritional risk of patients infected with COVID-19, and the BMI, and, thus, the prevalence of overweight and obesity among the participants. Other variables also studied were gender and race/skin color (white, black and others), which served as epidemiological parameters of the disease.

Nutritional risk was calculated through *the Nutritional Risk Screening* (NRS 2002), a tool considered the gold standard for nutritional screening, in which weight and BMI have great analytical importance.¹⁸ A high risk was found in most of the participants (more than 70%).

Moreover, considering the BMI, most individuals were overweight, a fact that corroborates several existing

studies about the disease, as described by Cai et al. in a retrospective observational study conducted in Shenzhen, China.¹⁹ It showed that most patients were overweight or already classified as obese. Another study conducted by Peng et al. demonstrated that patients with above-ideal BMI were more frequently recorded in critical cases of COVID-19.²⁰ These data highlight the importance of nutritional analysis in patients affected by this disease.

Among the 41 participants, 25 (61%) were male individuals, a fact that corroborates other studies, such as the studies conducted by Guan et al.²¹ and Galvão and Roncalli,²² that observed a higher prevalence of the disease in male patients, in addition to a greater tendency to severe forms in this population.

The collected data also demonstrated a higher prevalence of the disease in participants of non-white race/skin color when compared with the white race/skin color. This fact differs from that denoted in the national panorama surveyed by the National Household Sampling Survey (PNAD) on COVID-19 conducted in October 2020, by the Instituto Brasileiro de Geografia e Estatística (IBGE) in Brazil. In this survey, the white race has been the most notably affected.²³ This reinforces the need for further research on the disease, which incorporates the perspective of sex, gender and race/skin color, due to the scarcity of studies demonstrating such aspects, although there is already sufficient evidence that these characteristics are important in the expression of the disease and other associated morbidities.²⁴

Obesity is a chronic inflammatory disease, with increased cytokines and metabolic dysregulation. In addition, it is known that adipose tissue is a reservoir for viral propagation and means of amplification of chemokines in inflammation. In COVID-19 context, it is highlighted by its potentially severe character of inflammatory response. Studies have shown that obese people have a high risk of serious complications of COVID-19.²⁵

Thus, it is up to the managers of health services and health departments in the tripartite sphere to set up programs for health promotion, prevention, and monitoring of the most vulnerable individuals (in clinical and social lenses). Thus, health professionals should use strategies based on health education to explain to patients the importance of changes in lifestyle, healthy eating habits and, if possible, to refer to nutritional monitoring, and physical exercise. It is believed that coping strategies for this context based on interprofessional practices is salutary facing the pandemic of obesity and COVID-19.^{25,26}

The limitations of this study are the reduced number of patients evaluated, the geographical limitation of the analysis to a single observed region, the absence of the analysis of associated comorbidities. Moreover, because it is a cross-sectional study, it is not possible to establish a cause-effect relationship between the variables analyzed. However, evidence is highlighted that COVID-19 seems to be somehow related to the onset of nutritional risk and obesity.

Table 1 Characteristics of the patients with COVID-19 included in the study

Variable		N	%
Sex	Male	25	61.0
	Female	16	39.0
Race	Black	13	31.7
	White	5	12.2
	Others	23	56.1
BMI	Low Weight	1	2.4
	Eutrophic	9	22.0
	Overweight	14	34.1
	Class I obesity	8	19.5
	Class II obesity	6	14.6
	Class III obesity	3	7.3

n: Absolute Frequency; %: Relative Frequency; BMI: Body Mass Index. Salvador, Bahia, Brazil, 2020.

Conclusion

The present study showed the existence of a high prevalence of increased nutritional risk in patients affected by COVID-19. In addition, it can be concluded that obesity is an expressly present comorbidity in patients infected with SARS-CoV-2.

Therefore, with the COVID-19 pandemic in the background, it is imperative that the population pay more attention to eating habits for a better quality of life. It is still necessary to develop new studies that seek to assess the presence of high nutritional risk with the appearance of severe forms of the disease and its relationship with worse prognosis.

Conflict of Interests

The authors have no conflict of interests to declare.

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