



ORIGINAL ARTICLE

## Weight loss as a predictor of poor prognosis in patients hospitalized for COVID-19

*Perda de peso como preditor de mau prognóstico em pacientes hospitalizados com COVID-19*

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### KEYWORDS

COVID-19  
Prognosis  
Weight loss

### ABSTRACT

**Objective:** To evaluate the relationship between weight loss and markers of poor prognosis in patients hospitalized with COVID-19 in the state of Pernambuco.

**Methods:** A multicenter, cross-sectional study coupled with prospective analysis variables involving 71 individuals with COVID-19 admitted for hospitalization in 8 public hospitals in Recife, in the State of Pernambuco. Individuals of both sexes, aged  $\geq 20$  years, hospitalized from June 2020 to June 2021 were included. Sociodemographic, clinical, and nutritional data and prognostic markers were collected.

**Results:** The average age was  $54.6 \pm 15.6$  years, with 54.9% of individuals being male. It was found that 26.8% of the patients were diabetic and 52.1% were hypertensive. The anthropometric profile indicated that 56.3% were overweight and 5.6% were underweight. Positive screening for sarcopenia was observed in 16.9%. The median weight loss was 3.1% (0.0-6.6%), with a loss  $> 5\%$  evident in 29.6% of the sample. It was found that weight loss was more frequent in men (16 (41.0%) vs. 5 (15.6%);  $p = 0.020$ ) and that demographic, clinical, and nutritional variables were not associated with body weight loss. There was no statistical association between weight loss and prognostic variables ( $p$  NS).

**Conclusion:** Although the study did not demonstrate an association between weight loss and prognostic variables, this should be considered when assessing patients with COVID-19 and should be investigated and treated as an essential health promotion measure.

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**PALAVRAS-CHAVE**

COVID-19  
Perda de peso  
Prognóstico

**RESUMO**

**Objetivo:** Avaliar a relação entre a perda de peso com marcadores de mau prognóstico em pacientes hospitalizados com COVID-19 no estado de Pernambuco.

**Métodos:** Estudo multicêntrico, transversal, acoplado a algumas variáveis de análise prospectiva envolvendo 71 indivíduos com COVID-19 admitidos para internamento em 8 hospitais públicos de Recife, no Estado de Pernambuco. Foram incluídos indivíduos de ambos os sexos, com idade  $\geq 20$  anos, hospitalizados, no período de junho de 2020 a junho de 2021. Foram coletados dados sociodemográficos, clínicos, nutricionais e marcadores prognósticos.

**Resultados:** A média de idade foi  $54,6 \pm 15,6$  anos, sendo 54,9% dos indivíduos do sexo masculino. Verificou-se que 26,8% dos pacientes eram diabéticos e 52,1% eram hipertensos. O perfil antropométrico indicou 56,3% de excesso de peso e 5,6% de baixo peso. Observou-se rastreamento positivo para sarcopenia em 16,9%. A mediana da perda de peso foi 3,1% (0,0-6,6%), sendo uma perda  $> 5\%$  evidenciada em 29,6% da amostra. Verificou-se que a perda de peso foi mais frequente nos homens (16 (41,0%) vs. 5 (15,6%);  $p = 0,020$ ) e que as variáveis demográficas, clínicas e nutricionais não se associaram à redução do peso corporal. Não houve associação estatística entre a perda de peso e as variáveis prognósticas ( $p$  NS).

**Conclusão:** embora o estudo não tenha demonstrado associação entre a perda de peso e variáveis prognósticas, esta deve ser considerada na avaliação do paciente com COVID-19, devendo ser investigada e tratada como uma importante medida de promoção à saúde.

**INTRODUCTION**

At the end of 2019, a new coronavirus named SARS-CoV-2 appeared in Wuhan, China, and was responsible for the emergence of a new acute respiratory infection, now known as COVID-19<sup>1</sup>. The new coronavirus quickly spread throughout China and, later, throughout the world, and was declared a pandemic by the World Health Organization (WHO) on March 11, 2020<sup>2</sup>.

Transmission between humans occurs quickly, mainly through contact with droplets produced orally and nasally during person-to-person interactions<sup>3</sup>. According to the WHO, approximately 769 million cases were confirmed worldwide by August 2023, with Brazil being the sixth most affected country, with around 37 million confirmed cases and just over 704 thousand deaths<sup>4</sup>.

The main characteristic of this disease is respiratory compromise accompanied by symptoms such as fever and cough<sup>5</sup>. However, recent evidence has shown that clinical manifestations in the gastrointestinal tract, such as diarrhea, nausea, and vomiting, which, associated with malnutrition and loss of muscle mass, as well as metabolic changes, are considered the main reasons for acute and long-term damage to the health of patients affected by this disease<sup>6,7</sup>.

Patients with COVID-19 may experience weight loss because of multiple factors, including the induction of an acute inflammatory response<sup>8</sup>. Cell death can trigger the production of chemokines and cytokines, resulting in a robust inflammatory reaction, causing disturbances in tissue homeostasis, and accelerating the catabolism of nutrients such as proteins, glucose, and micronutrients<sup>9-11</sup>.

It was also observed that infected patients significantly reduced food intake during the days before hospitalization<sup>12</sup>. Kikutani et al.<sup>13</sup> reported in a study with 44 patients with COVID-19 that, during treatment for the infection, 43% had a weight loss of  $\geq 5\%$  and 25% had a weight loss of  $\geq 10\%$ .

There are still not enough studies that describe weight loss in patients with COVID-19 and how this

aspect can influence the clinical evolution of the disease. In this context, this study aimed to evaluate the relationship between weight loss and markers of poor prognosis in patients hospitalized with COVID-19 in the state of Pernambuco.

**METHODS**

This multicenter, cross-sectional study evaluated the hospitalization data of individuals diagnosed with COVID-19, of both sexes, aged  $\geq 20$  years, admitted for hospitalization in 8 public hospitals in the State of Pernambuco from June 2020 to June 2021.

This study is a subproject of a dynamic cohort entitled "Clinical, Nutritional and Sociodemographic Aspects Associated with Mortality in Patients With Covid-19: A Multicenter Study in the Brazilian Northeast", with a Coordinating Center based in the city of Maceió at the Federal University of Alagoas, and with the participation of 9 states in the Brazilian Northeast. For this investigation, data were included from 8 public hospitals in the city of Recife, Pernambuco: Hospital das Clínicas of the Federal University of Pernambuco (UFPE), Pronto-Socorro Cardiológico Universitário de Pernambuco (PROCAPE), Hospital dos Servidores do Estado, Hospital Barão de Lucena, Hospital Dom Moura, Hospital Miguel Arraes, Hospital da Restauração and Hospital Provisório do Recife/Aurora.

The selection of patients was conducted by health professionals who formed a team of researchers from each partner hospital through medical records. After identifying the patients, health professionals informed the local study coordinator, which contacted the patient or responsible family member by telephone to explain the objective of the study, invite them to participate in the research and, after the patient's agreement by telephone, the online form for consent and assent (when necessary) was sent.

All patients admitted to the institutions mentioned above who met the inclusion criteria (individuals with a confirmed test for COVID-19 infection by the RT-PCR molecular test through a naso-

oropharyngeal secretion swab or laboratory serology) were recruited for the investigation. Suspected individuals, but without confirmation through examination, people with physical disabilities (amputations or atrophy of a limb), pregnant women, patients with edema and/or ascites, and patients whose information regarding weight loss was incomplete or presented inconsistencies were excluded from the research.

The sample size was determined considering an alpha error of 5%, a beta error of 20%, a correlation between the percentage of weight loss and length of stay of 0.4 (p) (obtained in a pilot study with the first 30 patients admitted to the study), and a variability of 0.17 ( $d^2$ ), totaling a minimum sample size of 66 patients. This number was increased by 10% to cover possible losses, totaling 73 individuals to be included in the investigation. The sample was obtained by convenience, considering subsequent hospitalizations among patients eligible for analysis.

The researchers responsible for data collection were professionals from each service. Depending on the health unit, collection was carried out through electronic and/or physical records. An online form (Google Forms®) was used to collect information from patients' medical records. Each collaborating center had a specific spreadsheet that was then sent to the coordinating center.

The ratio ((Usual weight - Current weight on admission)/Usual weight) x 100 was used to calculate the percentage of weight loss (%WL). Prognostic variables included the length and outcome of hospitalization, need for admission to the intensive care unit (ICU), mechanical ventilatory support (invasive and non-invasive mechanical ventilation), use of vasoactive drugs, hemodynamic stability (defined according to the criteria established in protocols of each institution and obtained from the clinical records), and quantity and intensity of symptoms (obtained from the records).

The intensity of symptoms was classified as mild (without dyspnea; low fever or without fever; with or without cough), moderate (mild dyspnea, fever greater than 38 °C, with or without cough, but with bearable symptoms in perception of the patient), or severe (symptoms that were very disturbing in the patient's perception, high fever (> 39 °C), headache, muscle pain, moderate to severe dyspnea, need for oxygen therapy or ICU upon arrival at the hospital).

Sociodemographic (age, gender, marital status, race, years of study and per capita family income (dichotomized at the median per capita income of the sample itself: R\$ < 300.00 and R\$ ≥ 300.00)), clinical (presence of comorbidities (diabetes mellitus and systemic arterial hypertension, whose information was obtained from medical records)) and nutritional (status and screening for sarcopenia) covariates were considered.

Body mass index (BMI) was considered to assess nutritional status, obtained from the quotient between admission weight and the square of height. BMI was interpreted according to the categories recommended by the WHO<sup>14</sup> (1998) for adults, classified in a grouped manner, where low weight was considered when BMI < 18.5 kg/m<sup>2</sup>, eutrophic when BMI 18.5 - 24.9 kg/m<sup>2</sup> and

overweight when BMI > 24.9 kg/m<sup>2</sup>. For the elderly, BMI was interpreted according to Lipshitz<sup>15</sup> (1994).

The SARC-F questionnaire was administered directly to the patient in the first contact, considering the information relating to the period before admission to assess the risk of sarcopenia or positive screening for sarcopenia. This instrument contains 5 questions related to strength, assistance with walking, getting up from a chair, climbing stairs, and occurrence of falls, where results ≥ 6 points indicate sarcopenia<sup>16</sup>.

The research was approved by the Research Ethics Committee involving human beings at Hospital das Clínicas/UFPE following Resolution No. 466/12 of the National Health Council/Ministry of Health, under CAAE 54085121.8.0000.8807. All proposing institutions were aware of and complied with the provisions of Resolution 466/2012.

Data were analyzed using SPSS version 13.0 (SPSS Inc., Chicago, IL, USA). Continuous variables were tested for normality of distribution using the Kolmogorov-Smirnov test, described as mean and standard deviation when they presented a Gaussian distribution. When they presented a non-normal distribution (percentage of weight loss), the variable was described as median and interquartile range.

Pearson's chi-square or Fisher's exact test was used to assess the relationship between covariates and weight loss. To compare the percentage of weight loss, the Mann-Whitney U test was used. Statistical significance was considered when  $p < 0.05$ .

## RESULTS

After eliminating losses due to inconsistency of information, 71 patients comprised the final study sample. The mean age was 54.6 ± 15.6 years, with 54.9% being male. Most patients were brown (58.6%) and had > 9 years of education (Table 1).

It was found that 26.8% of the patients were diabetic and 52.1% were hypertensive. The anthropometric profile indicated that 56.3% were overweight and 5.6% were underweight. It was observed that 16.9% screened positive for sarcopenia. The median weight loss was 3.1% (0.0 - 6.6%), with a loss ≥ 5% evident in 29.6% (Table 1).

It was observed that 56.3% of patients had more than 4 symptoms upon hospital admission. The percentage of patients with moderate and severe symptoms was 48.5% and 16.2%, respectively. Approximately 7.0% of the patients presented with hemodynamic instability, and 5.7% required VAD during hospitalization. It was shown that 20.3% required admission to the intensive care unit (ICU) and 11.3% died. The median length of stay was 11.0 (6.0-18.0) days (Table 2).

Weight loss was more frequent in men, and other demographic, clinical, and nutritional variables were not associated with a reduction in body weight (Table 3).

There was no association between weight loss and prognostic variables (Table 4). When comparing the median weight loss percentage depending on demographic, clinical, and nutritional variables, the percentage was similar in all subgroups (Table 5).

**Table 1** – Sociodemographic, clinical, and nutritional characteristics of hospitalized patients infected with COVID-19. Recife-PE, Brazil (N = 71).

Variable	n (%)
Sex	
Male	39 (54.9)
Female	32 (45.1)
Age	
Adult	50 (70.4)
Elderly	21 (29.6)
Marital status	
With partner	42 (59.2)
No companion	29 (40.8)
Race	
White	23 (32.9)
Black	6 (8.6)
Brown	41 (58.6)
Education	
≤ 9 years	26 (36.6)
> 9 years	45 (63.4)
Per capita family income (R\$)	
< 300.00	32 (46.4)
≥ 300.00	37 (53.6)
SAH	37 (52.1)
DM	19 (26.8)
Nutritional Status (BMI)	
Low weight	4 (5.6)
Eutrophy	27 (38.0)
Overweight	40 (56.3)
Screening for sarcopenia (SARC-F)	
Without risk	59 (83.1)
Risk for sarcopenia	12 (16.9)
Weight loss	
< 5%	50 (70.4)
≥ 5%	21 (29.6)

SAH, Systemic Arterial Hypertension; DM, Diabetes Mellitus; BMI, Body Mass Index.

## DISCUSSION

Patients with COVID-19 had a weight loss of approximately 3% after admission to the hospital. This result is relatively lower than the data described by Bedock et al.<sup>17</sup>, who, in a longitudinal observational study with 91 patients, analyzed the evolution of nutritional parameters at the time of admission and 30 days after hospital discharge and reported a median loss of 5.4% compared with their usual weight at admission. Another investigation by Martin-Martinez et al.<sup>18</sup> revealed an even higher average percentage of weight loss (7.8%) before hospitalization of patients with COVID-19.

One aspect that must be considered when interpreting our results is that weight loss at hospital admission was related to the usual weight reported by the patient. There was no assessment of changes in body weight during the disease or the evolution of the infection. Therefore, the percentage of weight loss can be even more significant. In addition, it should be considered that the self-reported measurement of usual weight may have limitations in its accuracy due to the patient's memory bias.

Few investigations have described the mean or median weight loss in a sample of patients with COVID-

**Table 2** – Prognostic variables in hospitalized COVID-19-infected patients. Recife-PE, Brazil (N = 71).

Variable	n (%)
Number of symptoms	
≤ 4	31 (43.7)
> 4	40 (56.3)
Intensity of symptoms	
Light	24 (35.3)
Moderate	33 (48.5)
Serious	11 (16.2)
Hemodynamic stability	
Yes	65 (92.9)
No	5 (7.1)
Use of VAD	
Yes	4 (5.7)
No	66 (94.3)
Mechanical ventilation	
Spontaneous ventilation	46 (64.8)
Invasive and non-invasive mechanical ventilation	25 (35.2)
Need for ICU during hospitalization	
Yes	14 (20.3)
No	55 (79.7)
Length of stay	
< 11 days	35 (52.2)
≥ 11 days	32 (47.8)
Outcome	
High	52 (73.2)
Death	8 (11.3)
Transferred to another service	11 (15.5)

VAD, vasoactive drugs. ICU, intensive care unit.

19. Most studies have described a frequency of patients with weight loss greater than 5%. Our findings showed that almost 30% of the sample had a weight reduction ≥ 5%, and this result corroborates the data presented by Wierdsman et al.<sup>19</sup>, who indicated that 25% of their sample reported weight loss greater than 5% at the time of hospital admission and that one in five patients hospitalized with COVID-19 had previous weight loss. Furthermore, Filippo et al.<sup>20</sup>, evaluating patients with COVID-19 in a university hospital in Milan, Italy, reported that 31% had weight loss above 5%.

Other authors (Allard et al.<sup>21</sup>, Kikutani et al.<sup>13</sup>, Pironi et al.<sup>22</sup>) showed relatively higher percentages, indicating weight loss in patients with COVID-19 greater than or equal to 5% in approximately 37%, 43%, and 56% of the samples.

We did not investigate the change in nutritional status or whether weight loss led the patient to a condition of malnutrition, but malnutrition has already been identified as a risk factor for a poor prognosis in patients with COVID-19<sup>23</sup>. Furthermore, malnutrition impairs the immune system, making individuals more vulnerable to infections. This can impact recovery and length of hospital stay. Therefore, it is essential to document weight loss and the risk of malnutrition, especially in individuals with chronic diseases and the elderly<sup>24</sup>.

Weight loss in COVID-19 patients can be caused by several factors, including systemic inflammation, which increases the consumption of albumin to synthesize acute-phase proteins. Furthermore, immobilization in bed or muscle disuse resulting from rest, even for a short

**Table 3** – Sociodemographic, clinical, and nutritional factors associated with weight loss  $\geq 5\%$  in COVID-19-infected patients hospitalized in Recife-PE, Brazil (N = 71). Values in n (%).

Variable	No weight loss	Weight loss $\geq 5\%$	p-value*
Sex			
Masculine	23 (59.0)	16 (41.0)	0.020
Feminine	27 (84.4)	5 (15.6)	
Age			
Adult	37 (74.0)	13 (26.0)	0.308
Elderly	13 (61.9)	8 (38.1)	
Marital status			
With partner	30 (71.4)	12 (28.6)	0.823
No companion	20 (69.0)	9 (31.0)	
Race			
White	17 (73.9)	6 (26.1)	0.517
Black	3 (50.0)	3 (50.0)	
Brown	29 (70.0)	12 (29.3)	
Education			
$\leq 9$ years	18 (69.2)	8 (30.8)	0.867
$> 9$ years	32 (71.1)	13 (28.9)	
Per capita family income (R\$)			
$< 300.00$	24 (75.0)	8 (25.0)	0.362
$\geq 300.00$	24 (64.9)	13 (35.1)	
SAH			
No	25 (73.5)	9 (26.5)	0.582
Yes	25 (67.6)	12 (32.4)	
DM			
No	37 (71.2)	15 (28.8)	0.823
Yes	13 (68.4)	6 (31.6)	
Nutritional Status (BMI)			
Low weight	3 (75.0)	1 (25.0)	0.858
Eutrophy	18 (66.7)	9 (33.3)	
Overweight	29 (72.5)	11 (27.5)	
Screening for sarcopenia (SARC-F)			
Without risk	40 (67.8)	19 (32.3)	0.489
Risk for sarcopenia	10 (83.3)	2 (16.7)	

SAH, systemic arterial hypertension. DM, diabetes mellitus. BMI, body mass index. \*Pearson's chi-square test or Fisher's exact test.

period, can induce marked reductions in muscle protein synthesis, leading to weight loss, lean mass reduction, and sarcopenia<sup>7,20</sup>.

It should also be considered that the reduction in food intake due to loss of appetite, ageusia, fever, and sedation also contribute to catabolic overdrive, leading to weight loss in patients with COVID-19<sup>7,25</sup>. Previous research has reported a significant reduction in food intake in infected patients in the days before hospitalization<sup>12</sup>. Data from another cohort in Wuhan demonstrated that approximately 60% of patients could not eat normally in the days before hospitalization<sup>11</sup>.

Furthermore, the spike protein of the new coronavirus uses the angiotensin-converting enzyme 2 (ACE2) receptor to bind to a cell, allowing the viral genetic material to enter and infect it. These receptors are present throughout the body, including the skeletal muscle, resulting in tissue damage and loss of body mass<sup>26,27</sup>.

The greater weight loss among men corroborates the data presented by Filippo et al.<sup>20</sup>, who reported that 65% of patients who experienced weight loss were male. Factors associated with weight loss in patients with COVID-19 have not yet been explored in the scientific literature, with few investigations showing results on this topic. In any case, it is essential to consider that

infection with the SARS-CoV-2 virus leads to protein and muscle catabolism<sup>28</sup>, and as men constitutionally have more muscle mass than women, they can be affected more intensely with weight loss<sup>29</sup>.

The lack of association between age group and weight loss observed in our results differs from the data presented in a previous investigation in France, where weight loss was more prevalent in the elderly<sup>21</sup>. In the cohort of Fiorindi et al.<sup>30</sup>, it was also possible to find a correlation between age and weight loss in patients with COVID-19.

We should note that we found a significant percentage of patients at risk of sarcopenia (approximately 17%). Notably, patients with sarcopenia have impaired respiratory muscle function and strength, which may affect the evolution of a disease with respiratory involvement, such as COVID-19<sup>31,32</sup>. Our study design does not allow us to identify whether the risk for the condition of sarcopenia is prior to or resulting from the infection, but this is an aspect that must be evaluated in patients with COVID-19 due to the possible influence it may have on the evolution of the disease.

Although weight loss in patients with COVID-19 was not associated with a worse clinical prognosis in our study, a previous study demonstrated that although not significant, there was a trend toward a higher risk of

**Table 4** – Prognostic markers associated with weight loss  $\geq 5\%$  in COVID-19-infected patients hospitalized in Recife-PE, Brazil (N = 71). Values in n (%).

Variable	No weight loss	Weight loss $\geq 5\%$	p-value*
Number of symptoms			
$\leq 4$	22 (71.0)	9 (29.0)	0.929
$> 4$	28 (70.0)	12 (30.0)	
Intensity of symptoms			
Light	17 (70.8)	7 (29.2)	0.409
Moderate	25 (75.8)	8 (24.2)	
Serious	6 (54.5)	9 (45.5)	
Hemodynamic stability			
No	45 (69.2)	20 (30.8)	0.525
Yes	4 (80.0)	1 (20.0)	
Use of VAD			
No	46 (69.7)	20 (30.3)	0.653
Yes	3 (75.0)	1 (25.0)	
Mechanical ventilation			
Spontaneous Ventilation	31 (67.4)	15 (32.6)	0.448
Invasive and non-invasive mechanical ventilation	19 (76.0)	6 (24.0)	
Need for ICU during hospitalization			
No	38 (69.1)	17 (30.9)	0.742
Yes	11 (78.6)	3 (21.4)	
Length of stay			
$< 11$ days	27 (77.1)	8 (22.9)	0.117
$\geq 11$ days	19 (59.4)	13 (40.6)	
Outcome			
Discharged	33 (63.5)	19 (36.5)	0.103
Death	7 (87.5)	1 (12.5)	
Transferred	10 (90.9)	1 (9.1)	

ICU, Intensive Care Unit. VAD, vasoactive drugs. \*Pearson's chi-squared test or Fisher's exact test.

**Table 5** – Comparative analysis of the median loss percentage according to prognostic variables and risk of sarcopenia in patients infected with COVID-19 hospitalized in Recife-PE, Brazil (N = 71).

Variable	n	% weight loss		p-value*
		Median	IQR	
Number of symptoms				
$\leq 4$	31	2.3	0.0 - 7.7	0.898
$> 4$	40	3.3	0.0 - 5.4	
Intensity of symptoms				
Light	24	2.6	0.0 - 6.2	0.414
Moderate	33	1.4	0.0 - 4.8	
Serious	11	4.8	2.2 - 8.6	
Hemodynamic stability				
No	65	3.2	0.0 - 5.8	0.912
Yes	5	2.2	0.0 - 8.3	
Use of VAD				
No	66	3.1	0.0 - 5.6	0.971
Yes	4	1.9	0.0 - 10.6	
Mechanical ventilation				
Spontaneous Ventilation	25	3.2	0.0 - 5.1	0.582
Invasive and non-invasive mechanical ventilation	46	3.1	0.0 - 6.6	
Need for ICU during hospitalization				
No	55	3.3	0.0 - 6.4	0.453
Yes	14	1.1	0.0 - 4.3	
Length of stay				
$< 11$ days	35	2.3	0.0 - 4.7	0.140
$\geq 11$ days	32	3.9	0.0 - 8.3	
Outcome				
Discharged	52	3.4	0.0 - 7.0	0.106
Death	8	0.0	-3.1 - 0.0	
Transferred	11	3.8	0.0 - 3.9	
Screening for sarcopenia (SARC-F)				
Without risk	59	3.5	0.0 - 3.2	0.108
Risk for sarcopenia	12	0.0	0.0 - 3.0	

IQR, Interquartile range. VAD, vasoactive drugs. \*Mann-Whitney U test for comparing 2 medians and Kruskal-Wallis test for comparing 3 or more medians.

mortality in patients with weight loss above 5% of the initial weight. The same author also found no association between weight loss and the risk of transfer to the ICU and death<sup>19</sup>.

Other studies also demonstrated that weight loss alone was not associated with a worse prognosis in patients with COVID-19<sup>21</sup>. However, patients with malnutrition and weight loss in the last month were more predisposed to developing the infection in the severe form of the disease<sup>33</sup>.

Previous studies have shown that less weight loss could reduce complications and negative outcomes in patients with COVID-19<sup>19,34</sup>. Therefore, intervention and early nutritional therapy should be considered as part of the approach in patients affected by the disease<sup>23</sup>.

Some limitations in this study should be considered when interpreting the results. First, this is a cross-sectional study with non-probability sampling. Furthermore, as this is a study in which much information was collected from medical records, there may be errors in filling out information and heterogeneity in the records between different institutions. It should also be noted that only weight loss

was analyzed at the time of admission and not during hospitalization. However, it should be noted that, to date, few investigations have been undertaken to elucidate the role of weight loss as a marker of poor prognosis for patients hospitalized for COVID-19, and this study can contribute to the scientific theoretical debate and support future investigations.

## CONCLUSION

Significant weight loss was observed in patients with COVID-19, but this was not associated with poor prognosis parameters. Despite this, the clinical team should not dismiss weight loss and the risk of malnutrition in patients with COVID-19 as aspects that could have negative repercussions on the progression of the disease and should investigate and treat it in a multidisciplinary manner with measures that mitigate its occurrence. Therefore, preventing weight loss and preserving nutritional status is a significant health promotion measure, and screening and the institution of adequate nutritional therapy are essential.

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**Individual contribution of the authors:**

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