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Clinical and epidemiological profile of COVID-19 patients hospitalized in the North of Mato Grosso: A cross-sectional study

Perfil clínico e epidemiológico de pacientes com COVID-19 internados no Norte de Mato Grosso: Um estudo transversal

Perfil clínico y epidemiológico de pacientes con COVID-19 hospitalizados en el norte de Mato Grosso: Un estudio transversal

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Abstract

Objective: Studies have shown that obesity, age, presence of chronic disease, respiratory disease and cancer are risk factors for COVID-19, increasing the risk of hospitalization, complications, and the mortality rate. Thus, the objective of this study was to compare and evaluate the clinical and epidemiological profile of COVID-19 patients admitted to the nursery or Intensive Care Unit (ICU) of the Hospital Regional Jorge de Abreu (HRJA) in Sinop-MT. Methods: This was a cross-sectional study with data collected from medical records of patients diagnosed with COVID-19 and admitted between March 2020 and March 2021. Results: Data from 399 patients hospitalized in a nursery and 389 in ICU were evaluated. Days of symptoms, age and body weight were significantly higher in ICU patients compared to nursery. Furthermore, it was observed that patients admitted to the ICU had a higher prevalence of obesity, diabetes, cardiovascular diseases, and other non-transmitted chronic diseases (NTCD). There was no difference between the

groups regarding the presence of previous respiratory diseases. 82.2% of ICU patients and 18.8% of nursery patients required assisted mechanical ventilation. Percentage of patients requiring tracheostomy and presenting complications was also higher in the ICU. The mortality rate was significantly higher in ICU patients (75.2%) compared to nursery patients (13.9%). Conclusion: It was observed that the clinical and epidemiological profile of COVID-19 patients admitted to the ICU was more severe compared to those admitted to the nursery which can be associated with age, obesity and NTCD in these patients.
Keywords: COVID-19; SARS-CoV-2; Overweight; Obesity.

Resumo

Objetivo: Estudos têm demonstrado que a obesidade, a idade, a presença de doenças crônicas, doenças respiratórias e câncer são fatores de risco para a COVID-19, aumentando o risco de hospitalização, complicações e taxa de mortalidade. Assim, o objetivo deste estudo foi comparar e avaliar o perfil clínico e epidemiológico de pacientes com COVID-19 internados na enfermaria ou na Unidade de Terapia Intensiva (UTI) do Hospital Regional Jorge de Abreu (HRJA) em Sinop-MT. Métodos: Trata-se de um estudo transversal com dados coletados dos prontuários médicos de pacientes diagnosticados com COVID-19 e internados entre março de 2020 e março de 2021. Resultados: Foram avaliados dados de 399 pacientes internados em uma enfermaria e 389 em UTI. Os dias de sintomas, a idade e o peso corporal foram significativamente maiores em pacientes da UTI em comparação com a enfermaria. Além disso, observou-se que os pacientes internados na UTI tinham uma prevalência maior de obesidade, diabetes, doenças cardiovasculares e outras doenças crônicas não transmissíveis (DCNT). Não houve diferença entre os grupos em relação à presença de doenças respiratórias anteriores. 82,2% dos pacientes da UTI e 18,8% dos pacientes da enfermaria necessitaram de ventilação mecânica assistida. A porcentagem de pacientes que necessitaram de traqueostomia e apresentaram complicações também foi maior na UTI. A taxa de mortalidade foi significativamente maior em pacientes da UTI (75,2%) em comparação com pacientes da enfermaria (13,9%). Conclusão: Observou-se que o perfil clínico e epidemiológico de pacientes com COVID-19 internados na UTI foi mais grave em comparação com aqueles internados na enfermaria, o que pode estar associado à idade, obesidade e DCNT nesses pacientes.
Palavras-chave: COVID-19; SARS-CoV-2; Sobrepeso; Obesidade.

Resumen

Objetivo: Los estudios han demostrado que la obesidad, la edad, la presencia de enfermedades crónicas, enfermedades respiratorias y el cáncer son factores de riesgo para COVID-19, aumentando el riesgo de hospitalización, complicaciones y la tasa de mortalidad. Así, el objetivo de este estudio fue comparar y evaluar el perfil clínico y epidemiológico de los pacientes con COVID-19 ingresados en la enfermería o Unidad de Cuidados Intensivos (UCI) del Hospital Regional Jorge de Abreu (HRJA) en Sinop-MT. Métodos: Este fue un estudio transversal con datos recolectados de historias clínicas de pacientes con diagnóstico de COVID-19 e ingresados entre marzo de 2020 y marzo de 2021. Resultados: Se evaluaron datos de 399 pacientes hospitalizados en una sala de recién nacidos y 389 en UCI. Los días de síntomas, la edad y el peso corporal fueron significativamente mayores en los pacientes de UCI en comparación con los de enfermería. Además, se observó que los pacientes ingresados en la UCI tenían una mayor prevalencia de obesidad, diabetes, enfermedades cardiovasculares y otras enfermedades crónicas no transmisibles (ENT). No hubo diferencia entre los grupos en cuanto a la presencia de enfermedades respiratorias previas. El 82,2% de los pacientes de UCI y el 18,8% de los pacientes de enfermería requirieron ventilación mecánica asistida. El porcentaje de pacientes que requirieron traqueotomía y presentaron complicaciones también fue mayor en la UCI. La tasa de mortalidad fue significativamente mayor en los pacientes de la UCI (75,2 %) en comparación con los pacientes de enfermería (13,9 %). Conclusión: Se observó que el perfil clínico y epidemiológico de los pacientes con COVID-19 ingresados en la UTI fue más grave en comparación con los ingresados en la sala de recién nacidos, lo que puede estar asociado con la edad, la obesidad y el DTNT en estos pacientes.
Palabras clave: COVID-19; SARS-CoV-2; Exceso de peso; Obesidad.

1. Introduction

Coronavirus is an RNA (ribonucleic acid) zoonotic virus belonging to the Coronaviridae family, responsible for the development of respiratory infections (WHO, 2021). The new coronavirus, which causes COVID-19, was officially named SARS-CoV-2 in December 2019, after cases of the disease were reported in China, as described in a report on a group of cases with 'viral pneumonia' in Wuhan, People's Republic of China (Brasil, 2020; OPAS, 2020). COVID-19 has spread to more than 180 countries, becoming one of the biggest threats to public health of the last century, due to its high contagion rate and broad spectrum of manifestations, as it can present as either extensive pulmonary fibrosis or an asymptomatic condition (Chen et al., 2020).

According to the Brazilian Society of Infectious Diseases, the symptoms of COVID-19 are similar to a cold, without

many complications, with cases of infected individuals who do not present symptoms, but these individuals can transmit SARS-CoV-2 even when asymptomatic (SBI, 2021). The recovery time for mild or moderate COVID-19 is up to 14 days, with more intense signs possibly occurring in the second week (Andrade, 2021).

One in six infected people become seriously ill (WHO, 2021). Some severe forms progress and require hospitalization in Intensive Care Units (ICU), with the assistance of mechanical ventilation – a condition classified as Severe Acute Respiratory Syndrome (SARS) (Andrade, 2021). Obesity (BMI≥30 kg/m^2) is one of the main risk factors for the development of severe COVID-19, being directly related to the need for hospitalization and, subsequently, use of intra-hospital respiratory support equipment, whether invasive or not (Bellini et al., 2021). Concurrently, other risk factors contribute to the worsening of the disease, such as tumors, cardiovascular diseases, diabetes, chronic respiratory diseases, pregnant and postpartum women, as well as age over 60 years (Brasil, 2020; Bellini et al., 2021; OPAS, 2021).

Complications leading to death may include respiratory insufficiency, acute respiratory distress syndrome (ARDS), sepsis, septic shock, thromboembolism, and/or multiple organ failure (Andrade, 2021). Additionally, there is a pandemic of body weight disorders as a medical condition, affecting over 650 million obese individuals and more than 2 billion people with overweight worldwide (FMO, 2019). Obesity also leads to the development of other comorbidities, such as type 2 diabetes mellitus, cardiovascular disease, hypertension, dyslipidemia, and various types of cancer (Stefan et al., 2018). Furthermore, it creates a chronic low-grade inflammation, increasing the levels of certain cytokines and chemokines when compared to a lean individual. As a consequence, the innate and first-line immune cellular responses are compromised, resulting in damage to the respiratory mucosa (Dholia & Yadav, 2018).

Comorbidities related to individuals infected with SARS-CoV-2 are essential for the incidence of worsening clinical progression of the disease (Simonnet et al., 2020), and obesity exponentially increases the risk of mortality in infected individuals (Lopes et al., 2021). In these patients, adipose tissue interacts with the immune system and facilitates disease aggravation through biochemical, molecular, cellular, and immunological interactions (Filho et al., 2020). Currently, the pathophysiological mechanisms are still poorly understood but may be related to a chronic low-grade inflammation and suppression of innate and adaptive immune responses (Saltiel & Olefsky, 2017).

Finally, due to its deleterious effects on the immune and respiratory systems, obesity has been associated with a 3.4 times higher probability of COVID-19 worsening when compared to non-obese patients from a Chinese hospital (Cai et al., 2020). This is related to the fact that various adipose tissue cells (adipocytes, endothelial cells, stromal cells, and macrophages) are targets of different viruses (Ryan & Caplice, 2020).

Thus, the aim of this study was to analyze the clinical and epidemiological profile of patients diagnosed with COVID-19 in 2020 and 2021, hospitalized in nursery or ICU in a hospital of the North of Mato Grosso.

2. Methodology

2.1 Type of study, population, and place of study

This is a cross-sectional study, with data collected from March 2020 to March 2021, at the Hospital Regional Jorge de Abreu (HRJA) in Sinop-MT, a city located in the north of the state of Mato Grosso (MT). The data collected were from patients treated by the Brazilian National Health System (SUS). Data collection took place during weekly visits to HRJA and through electronic record-keeping and analysis of patient records in Excel spreadsheets.

A cross-sectional study aims to collect information about a population or sample of interest at a single point in time; it examines a population or group of individuals through data collection at a specific moment, without following them over time, analyzing the prevalence of a condition or characteristic. This study can be descriptive and analytic, as well as can be used to investigate some associations and possible risk factors for specific diseases (Babbie, 2015; Estrela, 2018).

2.2 Data collection procedures

Clinical and epidemiological data were collected from the medical records of patients diagnosed with COVID-19 (diagnostic confirmed by rapid test with nasopharyngeal swab sample and/or RT-PCR laboratory test) and admitted to the HRJA (ICU and nursery) from March 2020 to March 2021. The subjects' identities were kept confidential.

Data collection was performed through the analysis of medical records provided by the healthcare team, where the following data were collected and analyzed: general data (gender, age, city of origin, and smoking), anthropometric measurements (body weight, height, BMI), medical history (presence of comorbidities, incident diseases), and patient hospitalization progress (days of symptoms, types of symptoms, necessity of mechanical ventilation, tracheostomy, incidence of other complications, therapeutic profile and death).

Inclusion criteria: medical records of patients diagnosed with COVID-19 in March 2020 until March 2021, with or without comorbidities, obese or not, and who were hospitalized in the HRJA during this period (both in the nursery and in the ICU).

Exclusion criteria: medical records of patients younger than 18 years old and also all patients who were underweight (BMI <18.5 kg/m^2).

2.3 Groups of patients

To better analyze the clinical and epidemiological profile of hospitalized patients with COVID-19, data of patients was divided into two groups:

- Nursery Group: Patients with COVID-19 and hospitalized in a nursery of HRJA and
- ICU Group: Patients with COVID-19 and hospitalized in an ICU of HRJA.

2.4 Risks and benefits

The risks arising from the handling of medical records could be lost and possible damage, so to avoid them the measures adopted were the manipulation of medical records only in the place where they were, that is, in HRJA, and no materials that could damage it, such as water, coffee, and other foods were consumed in the local.

As a benefit, the research participants contributed, indirectly, to the survey of data that helped to better understand the clinical and epidemiological profile of COVID-19 patients hospitalized in a nursery or ICU of HRJA in Sinop-MT.

2.5 Data analysis

The data were tabulated and analyzed in the Microsoft® Excel® Software Spreadsheet (Office 365), using descriptive analysis, and evaluating frequency distribution.

The data were presented as mean ± standard deviation (SD) or in percentage (%). The results were statistically evaluated by Student's *t-test* for the quantitative analysis of continuous variables or by chi-square test (χ^2) in the case of analysis of categorical variables. The analyzes were carried out using the GraphPad Prism® 8 Program. The minimum acceptable significance level was $p < 0.05$.

2.6 Ethical aspects

The ethical aspects were considered following Resolution 466/12 of the Ministry of Health, which stipulates regulatory ethics standards for research involving human beings. The execution of the project was carried out only after the authorization received by the Medical Ethics Committee of the HRJA, as well as approval by the Ethics Committee on Research with Human Beings, process nº. 5.266.378.

3. Results and Discussion

3.1 Epidemiological profile of COVID-19 patients hospitalized in a Nursery or in an ICU unit of HRJA

Data were collected from 823 medical records, and according to the patients' location of hospitalization, the data were subdivided into two groups: Nursery (n = 399) and ICU (n = 389). 11 patients admitted to the nursery and 24 patients admitted to the ICU were excluded from the study due to not having a confirmed diagnosis of COVID-19 during their hospitalization, resulting in a total sample size of 788 medical records.

According to Table 1, it was observed that in both groups, the majority of patients were male, over 50 years old, married, and non-smokers. Furthermore, the highest percentage of patients were of white race and residents of the city of Sinop. There were no statistical differences regarding marital status, gender, race, and smoking status between the nursery and ICU patients.

Assessing the age range, it was observed that in the group of patients hospitalized in the nursery unit, the mean age of patients was significantly higher (55.9 ± 15.8) when compared to those in the ICU unit (51.0 ± 23.9), $p < 0.0001$. Furthermore, there was a higher prevalence of patients aged 60 or older in both groups. In a study conducted by Nascimento et al. (2022) analyzing the clinical-epidemiological profile of patients hospitalized for COVID-19 in the municipality of Cajazeiras, in the state of Paraíba, Brazil, the predominance of patients aged 60 or older (55%) was also observed. Due to the natural aging process, these patients are more susceptible to developing complications and severe forms of COVID-19 (Souza et al., 2021).

The predominance of male patients was also corroborated by Nascimento et al. (2022) and Klokner et al. (2021). It is believed that men are more susceptible to the worsening of COVID-19 due to hormonal, genetic, environmental, and comorbidity prevalence characteristics. Women (genotype XX), for example, when compared to men (genotype XY), have twice as many genes involved in immunity, as most of them are on the X chromosome.

Men also present a higher resistance to seeking health services, in addition to a higher prevalence of smokers among the male population (Silva et al., 2020). However, the study carried out by Tobias and Teixeira (2021) in the state of Goiás showed a higher prevalence of COVID-19 in female patients (51%), corroborating to the study by Cavalcante and Abreu (2020) in a municipality in Rio de Janeiro, where 51.4% of the patients were also female.

Regarding the patients' city of origin, there was a statistical difference between the groups, $p<0.0001$. Most of the patients in the nursery and ICU unit were from Sinop (69.1% and 65%, respectively). In the ICU, there were also many patients from Sorriso (19.7%) (Table 1).

Although most of the patients in this study were identified as non-smokers, it is necessary to take into account the large number of medical records that did not present this information. According to the study by Nascimento et al. (2022), smoking was one of the most common risk factors for hospitalization, which is corroborated by the descriptive analysis by Paiva et al. (2020) in the state of Paraná. Patients with a history of smoking are significantly more likely to require mechanical ventilation, predisposing to the development of other respiratory infections and acute respiratory syndrome, one of the main causes of death (Huang et al., 2020).

Table 1 - Epidemiological profile of COVID-19 hospitalized patients in the nursery and intensive care unit at the Hospital Regional Jorge de Abreu (HRJA) in Sinop-MT.

Variable	Nursery	ICU	*p*
n (Medical Records)	**399**	**389**	
Age (mean ± SD)	56 ± 16	51 ± 24	<0.0001
Marital status	**n (%)**	**n (%)**	0.11
Married	138 (55.6)	160 (51.1)	
Single	29 (11.6)	56 (17.8)	
Widowed	37 (14.9)	35 (11.1)	
Common-law marriage	26 (10.4)	29 (10.5)	
Divorced	18 (7.2)	33 (9.2)	
Sex#	**n (%)**	**n (%)**	0.51
Male	234 (58.6)	238 (61.2)	
Female	165 (41.3)	151 (38.8)	
Race	**n (%)**	**n (%)**	0.50
White	180 (46)	185 (47.9)	
Brown	125 (31.9)	129 (33.4)	
Yellow	58 (14.8)	42 (10.8)	
Black	21 (5.3)	25 (6.4)	
Indigenous	7 (1.7)	5 (1.2)	
City of origin	**n (%)**	**n (%)**	<0.0001
Sinop	208 (69.1)	175 (65.0)	
Sorriso	16 (5.3)	53 (19.7)	
Lucas do Rio Verde	26 (8.6)	5 (1.8)	
Santa Carmen	19 (6.3)	8 (2.9)	
Cláudia	13 (4.3)	13 (4.8)	
From other states	19 (6.3)	15 (5.5)	
Smoking#	**n (%)**	**n (%)**	0.77
Yes	54 (19.8)	45 (20.8)	
No	219 (80.2)	171 (79.2)	

Statistical analysis: Student's *t* test (unpaired), chi-square test ($\chi 2$) and Fisher's # test. Note: In the Marital Status variable, 151 patients from the ward and 76 from the ICU were excluded from the analysis because this information was not included in the medical record; In the Race variable, 8 records of patients from the ward and 3 from the ICU were also excluded from the analysis, and in the variable Smoking, 126 from the ward and 173 from the ICU were removed from the analysis, all for the same reason that this data was not included in the document. Source: Elaborated by the authors.

3.2 Clinical profile of COVID-19 patients hospitalized in a Nursery or in an ICU unit of HRJA

It is observed that body weight and BMI were significantly higher in the ICU group when compared to the nursery group, yet, it is observed that the highest percentage of patients admitted to the ICU are obese (44.8%) while in the nursery they are overweight (46.2%) (Table 2).

Table 2 - Clinical profile of hospitalized patients with COVID-19 in the Nursery and intensive care unit at the Hospital Regional Jorge de Abreu (HRJA) in Sinop-MT.

Variable	Nursery	ICU	*p*
n (Medical records)	**399**	**389**	
Body weight (kg) (mean ± SD)	80.8 ± 18.7	86.8 ± 21	<0.0001
Body weight range	**n (%)**	**n (%)**	0.003
45 a 65 kg	34 (20.8)	24 (12.4)	
66 a 85 kg	83 (50.9)	84 (43.2)	
86 a 100 kg	30 (18.4)	42 (21.6)	
> 100 kg	16 (9.8)	44 (22.6)	
BMI (kg/m^2) (mean ± SD)	28.8 ±6.1	30.8 ± 6.6	<0.0001
BMI range (kg/m^2)	**n (%)**	**n (%)**	0.01
Eutrophic	35 (24.1)	42 (17.2)	
Overweight	67 (46.2)	92 (37.8)	
Obese	43 (29.6)	109 (44.8)	
Diabetes mellitus[#]	**n (%)**	**n (%)**	0.09
Yes	127 (33.1)	166 (45.0)	
No	256 (66.8)	203 (55.0)	
Respiratory diseases[#]	**n (%)**	**n (%)**	0.06
Yes	50 (42.7)	67 (57.3)	
No	298 (52.2)	272 (47.8)	
Pre-existing respiratory diseases	**n (%)**	**n (%)**	0.84
COPD	30 (60)	39 (58.2)	
Asthma	13 (26)	16 (23.8)	
Other lung diseases	7 (14)	12 (17.9)	
Cardiovascular diseases[#]	**n (%)**	**n (%)**	<0.0001
Yes	230 (59.6)	280 (74.2)	
No	156 (40.4)	97 (25.7)	
Pre-existing cardiovascular diseases	**n (%)**	**n (%)**	0.03
Hypertension	140 (60.8)	194 (69.0)	
Hypertension + Heart failure	33 (14.3)	44 (15.7)	
Other heart diseases	57 (24.7)	43 (15.3)	
Other chronic comorbidities[#]	**n (%)**	**n (%)**	0.03
Yes	94 (25.6)	122 (32.8)	
No	273 (74.4)	250 (67.2)	
Pre-existing other chronic comorbidities	**n (%)**	**n (%)**	0.40
Chronic Dialysis Kidney Disease	18 (16.9)	20 (13.6)	
Neoplasms	14 (13.2)	15 (10.2)	
Others (depression, anxiety)	52 (49)	88 (59.8)	
Other incident diseases (dengue, previous surgery, leprosy)[#]	**n (%)**	**n (%)**	0.23
Yes	108 (30.2)	117 (32.5)	
No	250 (69.8)	223 (67.5)	

Results was expressed as mean ± standard deviation (SD) or as number of individuals and percentage (n (%)). Statistical analysis: Student's *t* test (unpaired), Chi-square test ($\chi 2$) and [#] Fisher's test. Note: In the variable Diabetes, 16 patients from the Nursery and 20 from the ICU were excluded from the analysis because this information was not included in the medical record; in the variable Respiratory diseases, 51 records of patients from the Nursery and 50 from the ICU were also excluded from the analysis; in Cardiovascular diseases, 13 from the Nursery and 12 from the ICU were excluded; in the variable Other chronic comorbidities, 32 from the Nursery and 17 from the ICU were excluded, and

in Other incident diseases, 41 records from the Nursery and 49 from the ICU were removed for the same reason. COPD = chronic obstructive pulmonary disease. Source: Elaborated by the authors.

In addition, although not all patients had BMI data in their medical records, the prevalence of overweight and obesity in this population sample can be observed. According to the data received in Table 2, it can be seen that among the patients hospitalized in the nursery, 46.2% are overweight and 29.6% are obese, while in the ICU, 37.8% of the patients are overweight and 44.8% are obese, demonstrating a significant number of patients with BMI $\geq$ 25 kg/m^2 admitted to the nursery (75.8%) and ICU (82.6%). This suggests that overweight and obesity can indeed be responsible for a greater worsening of the disease and the need for hospitalization.

Evaluating the prevalence of other diseases, in these patients, it was observed that patients admitted to the ICU had a higher prevalence of diabetes mellitus ($p=0.09$), cardiovascular diseases ($p<0.0001$) and other pre-existing chronic comorbidities ($p= 0.03$), when compared to patients admitted to the nursery (Table 2). No statistical difference was observed between groups regarding the presence of pre-existing and incident respiratory diseases, such as dengue and leprosy (Table 2).

Among patients who had respiratory diseases, most patients (more than 50%) in both groups had COPD (60% and 58.2%, respectively); among the pre-existing cardiovascular diseases, the most prevalent was arterial hypertension (60.8% and 69%, respectively) and among the other most prevalent chronic diseases, the most common was chronic kidney disease on dialysis (16.9% and 13.6%).

In addition to the cardiovascular diseases mentioned in Table 2, patients in the nursery and ICU also presented, respectively, hypertension associated with heart failure (33 and 44), heart failure (13 and 9), recent acute myocardial infarction (AMI) (12 and 10), atrial fibrillation (6 and 2), recent myocardial revascularization (4 and 6), obstructive coronary artery disease (4 and 3), bradycardia (3 and 2), atrioventricular block (2 and 2), obstructive cardiomegaly (2 and 2), congenital valvulopathies (1 and 3) and toxic dilated cardiomyopathy (1 and 2).

As well as advanced age (over 60 years), chronic diseases are also the main risk factors for the worsening of COVID-19 (Mendonça et al., 2020). According to Nascimento et al. (2022) and Paiva et al. (2020), the main risk factors include cardiovascular diseases, diabetes mellitus, obesity, respiratory diseases, and kidney diseases, corroborating the findings in the present study. Immunosuppressed patients are also more susceptible to severe forms of COVID-19 (Filho et al., 2020).

As previously noted, in this study, there was a greater number of ICU admissions among patients with cardiovascular diseases, corroborating other studies that demonstrated a greater risk of cardiac complications among individuals with cardiovascular comorbidities, with hypertension being one of the main factors associated with SARS-CoV-2 infection (Spiteri, et al., 2020; Fei et al., 2020; Tao et al., 2020; Shi et al., 2020), since the virus is capable of using ACE2 as an entry receptor in pneumocytes (Kreutz et al., 2020).

In the present study, a higher number of ICU admissions was also observed among patients with diabetes, when compared to patients in the nursery. In these individuals, the virus is able to trigger a high level of stress and, consequently, inflammatory and immune responses that lead to hypo or hyperglycemia. In the first case, there is activation of pro-inflammatory monocytes and platelet hyperreactivity, which can lead the patient to death due to cardiovascular complications. In the second case, the immune system is weakened (Wang et al., 2020; Hussain et al., 2020; Iqbal et al., 2019).

Corroborating with the data presented in this study regarding the prevalence of obese individuals hospitalized in the ICU, Ko et al. (2021) observed that almost half of the individuals were also obese, presenting 3 to 4.5 times higher chances of hospitalization compared to the healthy population. Obesity presents various factors that compromise the proper functioning of the body and trigger a chronic inflammatory state, increasing the risk of complications and the need for ventilatory assistance (Fernandes et al., 2022). In the study conducted by Silva et al. (2022) in the state of Pernambuco, obesity was one of the most frequent comorbidities and was present in 4.2% of deaths.

Table 3 - Clinical profile of hospitalized patients with Covid-19 in the Nursery and Intensive Care Unit at the Hospital Regional Jorge de Abreu (HRJA) in Sinop-MT.

Variable	Nursery	ICU	*p*
n (Medical Records)	**399**	**389**	
Total Hospitalization Days#	8 (6 – 13)	11 (7 – 19)	< 0.0001
Days of Symptoms	**n (%)**	**n (%)**	
1 a 7	171 (45)	181 (51.3)	0.02
8 a 14	177 (46.5)	121 (34.3)	
>14	23 (6)	47 (13.3)	
Asymptomatic	9 (2.4)	4 (1.1)	
Main Symptoms	**n (%)**	**n (%)**	
Dyspnea	220 (55.2)	225 (58.0)	0.09
Cough	160 (40.0)	200 (51.5)	
Fever	155 (39.0)	193 (49.6)	
Myalgia	65 (16.3)	55 (14.2)	
Anosmia/Hypogeusia	52 (13.0)	82 (21.0)	
Headache	49 (12.3)	57 (14.8)	
Others	173 (43.4)	238 (61.3)	
Contact with positive for COVID-19#	**n (%)**	**n (%)**	
Yes	185 (87.3)	115 (73.7)	0.09
No	27 (12.7)	41 (26.3)	
Chest CT Scan #	**n (%)**	**n (%)**	
Yes	283 (77.5)	297 (86.3)	0.02
No	82 (22.5)	47 (13.6)	
Therapeutic Profile	**n (%)**	**n (%)**	
Chloroquine	20 (5.0)	27 (7.0)	<0.0001
Ivermectin	10 (2.5)	11 (2.8)	
Azithromycin	160 (40.0)	240 (61.7)	
Other antimicrobials	195 (49.0)	314 (81.0)	
Glucocorticoid (e.g. dexamethasone	185 (46.5)	350 (90.0)	
Remdesivir / Ritonavir	----	----	
Tamiflu	50 (12.5)	70 (18.0)	
Monoclonal Antibody	3 (0.7)	5 (1.3)	
Anticoagulant	187 (47)	330 (85.0)	
Vasoactive Drugs	38 (9.6)	247 (63.5)	

Results was expressed as mean ± standard deviation (SD) or as number of individuals and percentage (n (%)). Statistical analysis: Student's *t* test (unpaired), Mann-Whitney test, Chi-square test ($\chi 2$) and # Fisher's test. SARI = Severe Acute Respiratory Failure; SARS = severe acute respiratory syndrome; CT =. chest tomography. Note: 19 records from the Nursery sector and 36 records from the ICU were removed from the variable Days of Symptoms; in the variable If you had contact with someone positive for COVID-19, 187 and 233; Chest tomography 34 and 45; Health professional 37 and 25; Mechanical ventilation 21 and 1; Tracheostomy 11 and 17; Other complications 12 and 15; respectively, because this information is not included in the patient's document. Source: Elaborated by the authors.

Among respiratory diseases, asthma and chronic obstructive pulmonary disease are the most frequent (Castro et al., 2021; Pontes et al., 2022; Paiva et al., 2020). A study carried out by Nesello et al. (2022) also noted the high prevalence of kidney disease among patients.

Evaluating the clinical status of patients resulting from COVID-19, described in Table 3, it can be seen that the average number of days in hospital showed a statistical difference between the ICU group (11 (7-19) days) when compared to

the nursery (8 (6-13) days), p<0.0001. There was no difference between the groups regarding the signs and symptoms presented and, in both groups, the majority had contact with someone positive for COVID-19 (Table 3).

No statistically significant differences were observed between the symptoms presented by patients in the ICU or in the nursery, p=0.09, with dyspnea, cough and fever being the main symptoms reported, corroborating the study by Nascimento et al. (2022). Most patients had few symptoms, however, some may require specialized care, such as low oxygen saturation and respiratory distress, requiring hospital treatment (Nascimento et al., 2022).

Most patients underwent chest tomography, the percentage being even higher and statistically different for ICU patients (p=0.002).

Regarding the therapeutic profile, a statistical difference was observed between the groups, showing that the type of treatment performed was different between the groups and respecting the particularities of each individual's complications, demonstrating that ICU patients were mostly treated with other antimicrobials (19.7%), azithromycin (15%), glucocorticoids (22%), anticoagulants (20.7%) and vasoactive drugs (15.5%) (Table 3).

Many patients in both groups used azithromycin (antimicrobial) or other antimicrobials, glucocorticoid steroids and anticoagulants. Only 2.3% of nursery patients and 1.7% of ICU patients used chloroquine, 1.2% of nursery patients and 0.7% of ICU patients used ivermectin in treatment, ~10% of patients used Tamiflu, and none used the antivirals, as Remdesivir and Ritonavir. In the study by Pontes et al. (2022), azithromycin was the most used medication, followed by anticoagulants and antivirals associated with antimicrobials.

3.3 Complications and prognosis of COVID-19 patients hospitalized in a nursery or in an ICU unit of HRJA

Regarding hospital complications such as the need for mechanical ventilation, tracheostomy, and other complications such as renal injury, it can be observed that the incidence of these deleterious outcomes was significantly higher in the ICU patient group when compared to those in the nursery group (p<0.0001), demonstrating that ICU patients present a more severe clinical condition and a higher risk of death, confirmed by the fact that 75.2% of ICU patients progressed to death while 13.9% of nursery patients died (Figure 1).

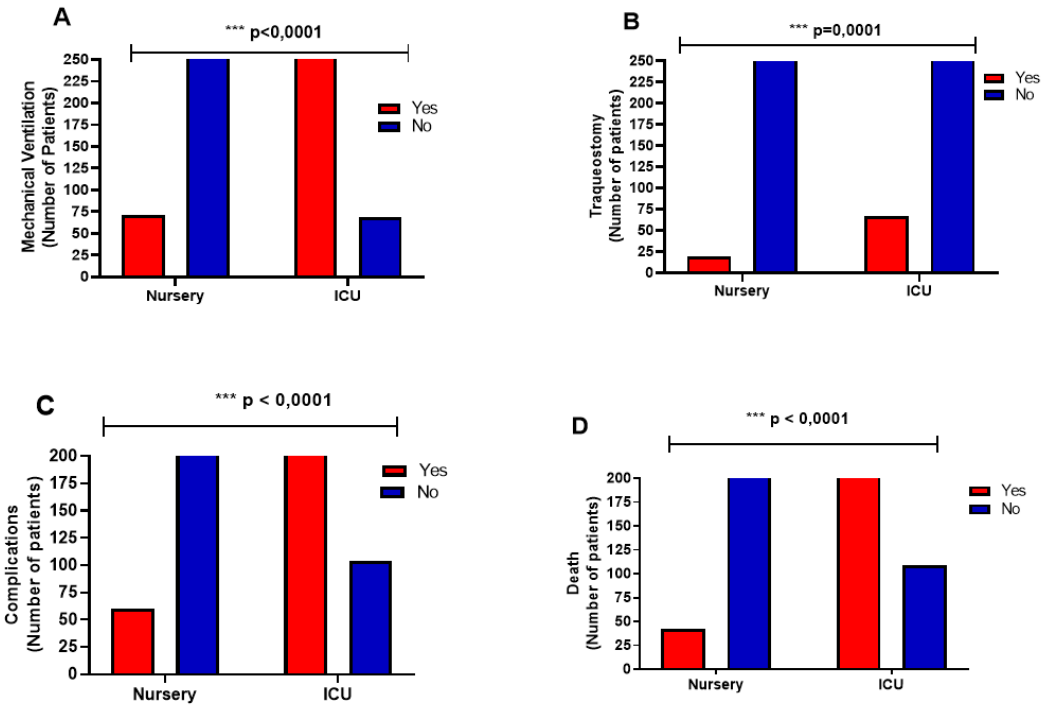
Several other complications were observed, the most common being: hemodialysis (12 and 65), Pneumonia (7 and 48), Blood transfusion (10 and 41), Cardiopulmonary arrest (3 and 46), Kidney damage (10 and 38), Sepsis (4 and 49) in the nursery and in the ICU, respectively.

Regarding deaths, 27 patients admitted to the nursery and 21 from ICU did not have this information in their medical records or were transferred to another hospital.

The death rate was higher in the ICU (75.2%), and in accordance with cause death it was observed that the predominant cause was the COVID-19 infection (22.3%), other causes were: acute respiratory syndrome, severe acute respiratory failure, primary hypertension, cardiac arrest, pneumonia, renal failure, septic shock, obesity, diabetes mellitus, pulmonary thromboembolism, among others. In additiom, in the ICU, 22 died of acute respiratory distress syndrome (ARDS) and 8 of mixed shock.

The odds ratio for mechanical ventilation was 19.9 [13.85-28.84], tracheostomy was 4.2 [2.5 – 7.1], other complications were 5.847 [3.98- 8.48], and for death was 18.67 [12.62-27.44].

Figure 1 - Clinical complications and prognosis of COVID-19 patients hospitalized in HRJA in the North of Mato Grosso.



A – Mechanical Ventilation. B - Tracheostomy. C – Other complications. D-Death. Groups: Nursery and ICU. Statistical analysis: Chi-square test (χ^2). Source: Elaborated by the authors.

According to Fei et al. (2020), patients with hypertension, diabetes mellitus, and heart diseases have a higher chance of developing respiratory complications, requiring mechanical ventilation, and consequently can death. Other studies show that elderly patients, smokers, obese, patients with cerebrovascular diseases and/or chronic pulmonary disease also have a higher chance of developing complications, such as acute respiratory syndrome and death (Tao et al., 2020; Spiteri et al., 2020; Mendonça et al., 2020; Shi et al., 2020). The present study had a higher number of elderly patients >60 years old (223 patients) and deaths (259) in the ICU unit. As previously mentioned, this age group may present different comorbidities over time, with an unfavorable progression and a higher mortality rate in this population.

4. Final Consideration

In conclusion, it was observed that the clinical profile of patients with COVID-19 admitted to the ICU was more severe when compared to patients admitted to the nursery and this seems to be associated with a higher prevalence of obesity, diabetes, and other chronic diseases present in these individuals.

Clinical and epidemiological data of COVID-19 patients in a nursery or ICU in a city of Sinop-MT may be of importance bringing important information for public health policies, once it demonstrated that these severe profile in ICU can be associated with overweight and obesity. Thus, suggesting that these obesity condition can be an important risk factor for a worst prognosis in COVID-19 patients. For future works it is suggested to develop other cohort or case-control studies to confirm the impact of obesity on COVID-19 clinical profile in hospitalized patients.

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References

Andrade, O. R. (2020). Os efeitos da Covid-19. *Rev pesquisa FAPESP*, 295. https://revistapesquisa.fapesp.br/os-efeitos-da-covid-19.

Babbie, E. (2015). *The Practice of Social Research*. Cengage Learning.

Brasil. (2020). Guia de Vigilância Epidemiológica. Emergência de Saúde Pública de importância nacional pela doença pelo Coronavírus 2019: Vigilância de Síndromes Respiratórias Agudas: COVID-19. Brasília, DF. Ministério da Saúde. Secretaria de Vigilância em Saúde. https://portalarquivos.saude.gov.br/images/af_gvs_coronavirus_6ago20_ajustes-finais- 2.pdf.

Bellini, B., Cresci, B., Cosentino, C., Profili, F. et al. (2020). Obesity as a risk factor for hospitalization in Coronavirus Disease-19 (COVID-19) patients: Analysis of the Tuscany regional database. *Nutr Metab Cardiovasc Dis*, 31, p. 769-773. https://doi.org/10.1016/j.numecd.2020.11.030.

Cai, Q., Chen, F., Wang, T. et al. (2020). Obesity and Severity of COVID-19 at a Designated Hospital in Shenzhen, China. *Diabetes care*. 43, 1392-1398.

Castro, M. L. et al. (2021) Profile of patients in an adult intensive care unit in a municipality in Paraíba. *Enfermería Actual de Costa Rica*, (40), 42910, https://dx.doi.org/10.15517/revenf.v0i40.42910.

Cavalcante, J. R. & Abreu, A. J. (2020). COVID-19 in the city of Rio de Janeiro: spatial analysis of the first confirmed cases and deaths. *Epidemiologia e Serviços de Saúde*. 29 (3), e2020204. https://doi.org/10.5123/S1679-49742020000300007.

Chen, N., Zhou, M., Dong, X., et al. (2020). Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *Lancet*, 395, 507-513.

Dholia, N., & Yadav, U. C. S. (2018). Lipid mediator leukotriene D (4) induces airway epithelial cells proliferation through EGFR/ERK1/2 pathway. *Prostaglandins & Other Lipid Mediators*, 136, 55-63.

Estrela, C. (2018). Metodologia Científica: Ciência, Ensino, Pesquisa. Editora Artes Médicas.

Fei, Z., et al. (2020). Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. The *Lancet*, 395, 1054-1062.

Fernandes, L. R., et al. (2022). Epidemiological profile of COVID-19 cases in a city in northwest São Paulo. Boletim Epidemiológico Paulista, 19 (217).

Federação Mundial da Obesidade (FMO). (2019). Prevalence of obesity. England and Wales, GB. https://www.worldobesity.org/about/about-obesity/prevalence-of-obesity.

Filho, E. R. A., Reis, I. P., Sandim, L. S., Ramos, R. O. et al. (2020). Profile of Covid-19 notified and confirmed cases in the period from April and May 2020 in the Federal District. *REVISA*, 9, 646-655. https://pesquisa.bvsalud.org/portal/resource/pt/biblio-1128837.

Huang, C., et al. (2020). Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *The Lancet*, 395, 497-506.

Hussain, A., et al. (2020). COVID-19 and diabetes: knowledge in progress. Diabetes *Research and Clinical Practice*, 162. e108142. https:// 10.1016/j.diabres.2020.108142.

Iqbal, A., et al. (2019). Effect of hypoglycemia on inflammatory responses and the response to low-dose endotoxemia in humans. *The Journal of Clinical Endocrinology & Metabolism*, 104(4), 1187-1199.

Klokner, S. G. M., et al. (2021). Epidemiological profile and risk factors for COVID-19 in southern Brazil. *Research, Society and Development*, 10 (3), e e17710313197.

Ko, J., et al. (2021). Risk Factors for COVID-19-associated hospitalization: COVID-19-Associated Hospitalization Surveillance Network and Behavioral Risk Factor Surveillance System. *Clinical Infectious Diseases*, 1 (72), e695-703.

Kreutz, R., et al. (2020). Hypertension, the renin-angiotensin system, and the risk of lower respiratory tract infections and lung injury: implications for COVID-19. *Cardiovascular Research*, 1(1), 1-12.

Lopes R. D. et al. (2021). Therapeutic versus prophylactic anticoagulation for patients admitted to hospital with COVID-19 and elevated D-dimer concentration (ACTION): an open-label, multicentre, randomised, controlled trial. *Lancet*. 12 (397), 2253-2263. https://10.1016/S0140-6736(21)01203-4.

Mendonça, K. D. S., et al. (2020). Risk factors for worsening COVID-19 in young individuals. *Enfermagem em Foco*, 11(2), 37-45.

Nascimento, G. M. I., et al. (2022). Clinical-epidemiological profile of hospitalization cases due to COVID-19 in the ninth health region of Paraíba, Brazil. *Research, Society and Development*, 11(1). e29011124761. http://dx.doi.org/10.33448/rsd-v11i1.24761.

Nesello, K., et al. (2022). Epidemiological profile, risk of worsening and death from COVID-19 in patients with heart disease in Brazil. *Journal Health NPEPS*, 7(1), e620.

Organização Pan-Americana de Saúde (OPAS). (2020). Folha informativa COVID-19. Brasília, DF. https://www.paho.org/bra/index.php?option=com_content&view=article&id=6101:covid19&Itemid=875#risco.

Paiva, C. I., et al. (2020). Epidemiological profile of COVID-19 in the State of Paraná. *Revista de Saúde Pública do Paraná*, 3, 39-61.

Pontes, L., et al. (2022). Clinical profile and factors associated with death of COVID-19 patients in the first months of the pandemic. *Escola Anna Nery*, 26, e20210203.

Ryan, P. MC., & Caplice, N. M. (2020). Is Adipose Tissue a Reservoir for Viral Spread, Immune Activation, and Cytokine Amplification in Coronavirus Disease 2019? *Obesity*. 28(7), 1191-1194. https://10.1002/oby.22843

Saltiel, A. R., & Olefsky, J. M. (2017). Mechanisms linking obesity and metabolic disease. *Journal of Clinical Investigation*, 127, 1-4.

Sociedade Brasileira de Infectologia (SBI). (2021). Covid 19. São Paulo, SP. https://infectologia.org.br/?s=covid+19.

Shi, Y., et al. (2020). Host susceptibility to severe COVID-19 and establishment of a host risk score: findings of 487 causes outside Wuhan. *Critical Care*, 24(1), 108.

Silva, A. W. C., et al. (2020). Clinical characterization and epidemiology of 1560 cases of COVID-19 in Macapá/AP, extreme north of Brazil. *Research, Society and Development*, 9(8), e150985499. https://10.33448/rsd-v9i8.5499.

Silva, E. O., et al. (2022). Epidemiological profile of COVID-19 cases in the VIII health region of Pernambuco, Brazil. *Revista de Saúde Coletiva da UEFS*, 12(1), e7520.

Simonnet, A., Chetboun, M., Poissy, et al. (2020). High Prevalence of Obesity in Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) Requiring Invasive Mechanical Ventilation. *Obesity Journal*, 28, 1195-1199.

Souza, T. A., et al. (2021). Vulnerabilidade e fatores de risco associados para COVID-19 em idosos institucionalizados. *Revista Eletrônica Acervo Saúde*, 13(2), e5947. https://doi.org/10.25248/reas.e5947.2021.

Spiteri, G., et al. (2020). First cases of coronavirus disease 2019 (COVID-19) in the WHO European Region. *Euro Surveillance*, 25(9), e2000178. http://10.2807/1560-7917.ES.2020.25.9.2000178.

Stefan, N., Häring, H. U., & Schulze, M. B. (2018). Metabolically healthy obesity: the low-hanging fruit in obesity treatment? *Diabetes & Endocrinology*, 6, 249-258.

Tao, C., et al. (2020). Clinical characteristics of 113 deceased patients with coronavirus disease 2019: retrospective study. *BMJ*, 368(1091). https://doi.org/10.1136/bmj.m1091

Tobias, G., & Teixeira, C. (2021). Epidemiological profile of confirmed cases of COVID-19 in the state of Goiás. In: Siqueira, Samylla. COVID-19: The work of health professionals in times of a pandemic. São Paulo: Editora Científica Digital.

Wang, A., et al. (2020). Timely blood glucose management for the outbreak of 2019 novel coronavirus disease (COVID-19) is urgently needed. *Diabetes Research and Clinical Practice*, 162, e 108118. https://10.1016/j.diabres.2020.108118.

World Health Organization (WHO) (2021). COVID-19 clinical management: living guidance. https://www.who.int/news-room/q-a-detail/coronavirus-disease-covid-19.