Socio-Demographic and Clinical Characteristics of Patients with COVID-19 Admitted to the Intensive Care Unit

Características Sociodemográficas e Clínicas dos Pacientes com COVID-19 Internados na Unidade de Terapia Intensiva

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Abstract

Coronavirus Disease 2019 (COVID-19) is characterized by a clinical signal that varies from asymptomatic infections to severe respiratory conditions. The virus has a high degree of transmissibility and around 6 to 10% require intensive care1, generating a greater burden on Intensive Care Units (ICUs). To describe the sociodemographic and clinical characteristics of COVID-19 patients admitted to an Intensive Care Unit (ICU). Observational, cross-sectional and prospective study carried out in a COVID-ICU between March 2020 and 2021. COVID-19 patients aged 18 or over were included in the study. The sample consisted of 169 individuals who were predominantly male (63.9%), white (86.4%) and with a mean age of 56 (±14.02) years. The most commonly reported symptoms were dyspnea (84%), fever (61%) and dry cough (40%). The average duration of invasive mechanical ventilation (IMV) was 15 (±10.8) days; ICU stay, 12 (±11.2) days and hospital stay, 22 (±39.5) days. The observed mortality rate was 43.8%. The majority of inpatients had coexisting comorbidities and required IMV. More than a third of the patients died. This information is relevant because it characterizes the sociodemographic and clinical profile of COVID-19 patients, allowing us to compare the profile of these patients with other regions of the world. This serves as a starting point for future research to minimize the impact caused by the disease and the damage caused by the current situation.

Keywords: Coronavirus. Health Profile. SARS-CoV-2. Intensive Care Unit.

Resumo

A Coronavirus Disease 2019 (COVID-19) é caracterizada por um quadro clínico que varia de infecções assintomáticas a quadros respiratórios graves. O vírus possui alto grau de transmissibilidade e cerca de 6 a 10% necessitam de cuidados intensivos1, gerando maior encargo às Unidades de Terapia Intensivas (UTIs). Descrever as características sociodemográficas e clínicas dos pacientes com COVID-19 internados em Unidade de Terapia Intensiva (UTI). Estudo observacional, transversal e prospectivo realizado em uma UTI-COVID, entre março de 2020 a 2021. Foram incluídos no estudo pacientes com COVID-19 com idade igual ou superior a 18 anos. A amostra foi composta por 169 indivíduos predominantemente do sexo masculino (63,9%), brancos (86,4%) e com média de idade de 56 (±14,02) anos. Os sintomas mais relatados foram: dispneia (84%), febre (61%) e tosse seca (40%). A média de tempo de ventilação mecânica invasiva (VMI) foi de 15 (±10,8) dias; internação na UTI, 12 (±11,2) dias e internação hospitalar, 22 (±39,5) dias. A taxa de mortalidade observada foi de 43,8%. A maioria dos pacientes internados possuíam comorbidade coexistente e necessitaram de VMI. Mais que um terço dos pacientes evoluíram a óbito. Essas informações são relevantes pois caracterizam de forma sociodemográfica e clínica os pacientes com COVID-19, propiciando a comparação do perfil destes pacientes com outros regiões do mundo. Isto serve como ponto de partida para futuras pesquisas, no intuito de minimizar o impacto causado pela doença e os danos da situação atual.

Palavras-chave: Coronavírus. Perfil de Saúde. SARS-CoV-2. Unidade de Terapia Intensiva.

1 Introduction

The clinical disease triggered by SARS-CoV-2 is called COVID-19 and belongs to the coronavirus family. Before the emergence of this new virus, there was knowledge of two other strains that caused epidemiological outbreaks. The first known as SARS-CoV-1, which causes severe acute respiratory syndrome (SARS) in 2002 and the second known as MERS-CoV, which causes Middle Eastern Respiratory Syndrome (MERS) in 2012[1]. The COVID-19 epidemic was declared in 2019 in China and since then, the spread has increased exponentially, including since March 2020, Brazil. Being in this same period, declared as a pandemic situation by the World Health Organization (WHO)[1,2].

COVID-19 is characterized by a clinical signal that varies from asymptomatic infections to severe respiratory conditions[3]. In the initial clinical sphere, the most commonly reported signs and symptoms include: Cough, dyspnea, fever, expectoration, odynophagia, myalgia, fatigue, anosmia, ageusia and headache[2,3]. In the analysis of imaging tests, such as computed tomography (CT), it is possible to verify irregular and bilateral ground-glass opacities, and may present multiple consolidations, with the course of the disease[2]. During hospitalization, it is common for most patients to receive a diagnosis of pneumonia, followed by acute respiratory distress syndrome (ARDS)[3].

Most individuals infected with the virus have mild signs,

without the need for hospitalization. However, it is observed that the disease affects older individuals with greater severity and/or with co-existing comorbidity, which may contribute to decompensation of the underlying disease, thus intensifying the severity of the signs[3]. The virus has a high degree of transmissibility and around 6 to 10% require intensive care[1], generating a greater burden on Intensive Care Units (ICUs). In cases of greater severity, patients may have a need for prolonged mechanical invasive ventilation (IMV), use of sedation and neuromuscular blockers, which contributes significantly to IMV-induced lung injury and also, to ICU[4] acquired weakness, and consequently, there is an increase in morbidity and mortality rates[4]. To date, more than 350 million cases have been confirmed worldwide, with more than 5.5 million deaths. In Brazil alone, more than 23 million infected and more than 623 thousand deaths were recorded[5].

Although it is known the severity of the disease in the elderly and individuals with comorbidities, a more in-depth analysis of specific risk factors and their interactions can be valuable to direct preventive interventions. In addition, a detailed investigation of the health system capacity in different regions, as well as effective strategies to manage the increase in demand, is essential. The mention of mechanical ventilation-induced lung injury highlights the need for further research on therapeutic and preventive approaches to mitigate these adverse effects. These gaps in the literature highlight the relevance of more comprehensive investigations, providing crucial insights for clinical management, public health strategies and future research in the context of the COVID-19 pandemic.

Given this situation, there is a high increase in hospital admissions rates, demand for ICU beds and advanced respiratory support, generating a higher burden of health systems. Thus, identifying and understanding the sociodemographic and clinical characteristics of individuals in a given region becomes essential, in order to know the profile of these patients and provide better clinical management. Furthermore, this serves as a starting point for future research, searching for thus, actions which can minimize the impact caused by the disease and the damage caused by the current situation.

2 Material and Methods

This is an observational, descriptive and retrospective cross-sectional study, adopting the STROBE protocol (Strengthening the Reporting of Observational Studies in Epidemiology) [14] that pointed out the sociodemographic and clinical characteristics of patients with COVID-19, admitted to the ICU-COVID of the Regional Hospital of São José Doutor Homero de Miranda Gomes (HRSJ-HMG), between March 2020 to March 2021. This study was approved by the Ethics and Research Committee in Human Beings (CEP) of the Institute of Cardiology of Santa Catarina (ICSC), under number CAAE 32352620.9.0000.0113, number of the approval opinion of CEP: 4.859.480. As this is a retrospective study without intervention, the research dismissed the Free and Informed Consent Form, according to CEP approval.

Data collection was performed through electronic medical records (*Micromed System*) of all patients attended by the Physiotherapy team, with suspicion of COVID-19, being tabulated through the Microsoft® Office Excel 2010 tool. Patients with COVID-19 diagnosis confirmed by real-time reverse transcriptase polymerase chain reaction test (RT-PCR) were included in the study and needed hospitalization in the intensive care unit (ICU).

The data collected included sociodemographic, clinical and image examination information and were treated using descriptive statistics, using the Statistical Package for Social Science (SPSS), version 22.0. The data normality was tested by the Kolmogorov Smirnov test and histograms, the continuous variables being expressed as median and interquartile interval for better representation, as well as the absolute and relative frequency for the other categorical variables contained in the present study was calculated.

3 Results and Discussion

From March 2020 to March 2021, 169 individuals admitted to the ICU with COVID-19 diagnosis, whose data related to demographics, clinical symptoms and imaging tests were available in the institution's electronic medical record. Thus, the sociodemographic and clinical characteristics of the patients who composed the study are presented below (Table 1).
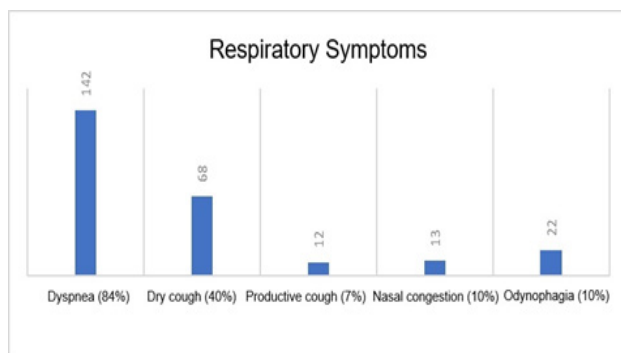
Table 1 - Sociodemographic and clinical characteristics of the sample

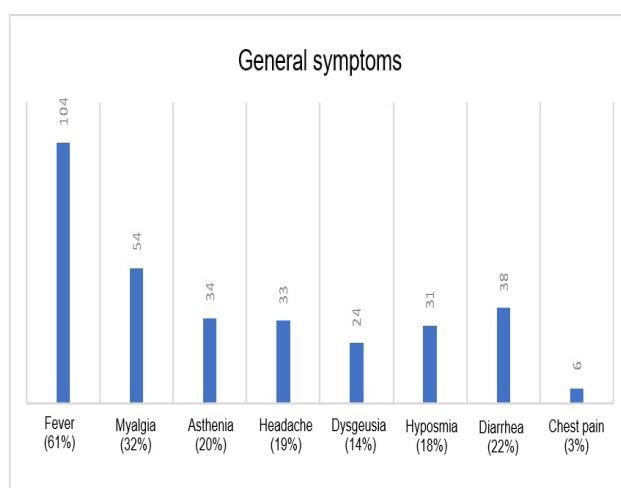| Variables	N (%)
Male	108 (63.9)
Age (years)	56 (14.02)
Ethnicity:	
White	146 (86.4)
Brown	13 (7.7)
Black	10 (5.9)
Alcoholism	8 (4.7)
Ex alcoholic	3 (1.8)
Smoking	9 (5.3)
Ex smoker	40 (23.7)
Associated Comorbidities	
Systemic Arterial Hypertension	85 (50.3)
Diabetes	60 (35.5)
Obesity	46 (27.2)
Cardiovascular	30 (17.8)
Pulmonary	29 (17.2)
Autoimmune	17 (10.1)
Neurological	15 (8.9)
Metabolic	13 (7.7)
Surgeries, dysfunctions and abdominal diseases	13 (7.7)
Previous Renal	7 (4.1)
Cancer	7 (4.1)
Psychiatric	7 (4.1)
Overweight	4 (2.4)
Others	13 (7.7)

Source: research data.

Still characterizing the clinical profile of patients, the respiratory symptoms (Figure 1) and general symptoms (Figure 2) of patients with COVID-19 stand out.

Figure 1 – Respiratory symptoms

Figure 2 – General symptoms of the patient with COVID-19

The results related to imaging tests, regarding tomographic pattern and degree of involvement (Table 2).

Table 2 – Characteristics of the image exams

Image Exam		N 148
Tomographic pattern	Typical	127 (85.8)
	Undetermined pattern	11 (7.4)
	Atypical	10 (6.8)
Degree of impairment	Up to 25%	11 (8.0)
	26-50%	75 (54.7)
	51-75%	43 (31.4)
	76-100%	8 (5.8)

Table 3 shows patients who needed invasive ventilatory support, either through orotracheal intubation (IOT) or tracheostomy (TQT). In addition, it presents the characteristics of hospitalizations and their consequent outcomes.

Table 3 stics related to during the length of hospital stay

Variable	N 169
Orotracheal intubation	153 (90.5)
Orotracheal reintubation	6 (3.6)
Tracheostomy	32 (18.9)
VMI time (days)	15 (10.8)
Length of ICU stay (days)	12 (11.2)
Length of Hospital stay (days)	22 (39.5)
Outcomes:	
Death	74 (43.8)
Discharge	55 (32.5)
Hospital Transfer	40 (23.7)

The subjects of the present study were predominantly male (63.9%), which corroborates the findings of Ranzani et al, 2021, a study that described the sociodemographic profile of the first 250,000 patients admitted with COVID-19 in Brazil, that presented in its sample a proportion of 56% of male individuals[6]. This same value is repeated in the study carried out at the Hospital Israelita Albert Einstein (HIAE) in 2020 and, in this same line, the reports from China and Singapore, bring values of 58.1% and 50%, respectively[6,7].

Ferreira et al.[8], presents in their study a discussion about the possible causes of men to be more likely to be infected than women. According to the author, men may have presented a more negligent behavior in relation to social isolation. He also exposes the context in which man sees himself as an invulnerable being, which can contribute to the increase of risks, acute or chronic[8]. In his work, Ferreira et al. mentions that studies that point to the contrary, a possible explanation would be that in the health sector, most professionals are female[8].

Regarding age, our results showed a median of 59 years. Generally, contamination begins to occur in a higher proportion from 20 years[8], and most studies bring the results divided by age group, with a higher percentage of contamination between 12-49 years[7], 20-39 years[8] and 60-69 years[6]. In addition, the direct relationship between age increase and mortality increase is highlighted[8].

Regarding the ethnicity of our sample, it is important to highlight that it was not self-declared. This variable was classified by a health professional, resulting in 86.4% of cases in white individuals. Large-spectrum studies, such as the Ranzani group and collaborators[6], present equivalent results for the white and black population, corresponding to 49% for both. For studies where the percentage of blacks and browns was higher, relevant considerations are indicated, since there are differences related to economic and social factors, making these groups more vulnerable[8].

With similar characteristics, the level of education also becomes a risk factor, taking into account the social class, which suggests that habits, living conditions and knowledge

about the disease can influence both in the dissemination, as for the prognosis[6,8] individuals with lower school levels are more likely to be contaminated by the virus, because they use public transport, live and attend spaces with more people and have less access to medical resources[8]. In the present study, most of the individuals present only elementary school (51.5%) and high school (22.5%), which corroborates the above mentioned discussion.

Regarding lifestyle in relation to habits, most of our sample did not present alcohol habit and/or dependence (93.5%), and only 3 individuals reported a previous history of ex-alcoholism. On the other hand, smoking becomes a frequent or better reported habit in society. Studies associate the relationship of COVID-19 damage and smoking, considering that smoking increases the chances of various lung diseases and consequently, a decline in pulmonary function[9]. Studies suggest that tobacco increases the severity of influenza infection, expanding viral replication and changes in immunity cells in the mucosa. In addition, it also amplifies the expression of the angiotensin 2 conversing enzyme (ECA2), SARS-CoV-2[9] receiver. In our study, most individuals were not smokers 71%, however, about 23.7% reported previous history.

In the initial clinical sphere, the signs and symptoms most commonly reported in the studies include: fever, cough, expectoration, nasal congestion, dyspnea, headache, myalgia, fatigue, odynophagia, anosmia and ageusia[2,3,7,8]. There are reports in a lower proportion of episodes of diarrhea, hemoptysis and chest pain[2,3,8,10]. In our sample, symptoms such as dyspnea (84%), fever (61.5%) and myalgia (32%) stood out in relation to the others.

Regarding the risk factors for more serious outcomes such as the need for ICU admission and/or use of VMI and death are: age equal to or greater than 65 years; persons admitted to long-term institutions; patients with chronic obstructive pulmonary disease (COPD), asthma (moderate to severe) and oxygen dependent; people with severe or decompensated heart problems; decompensated hypertensive; diabetics; patients with chromosomal diseases or immune fragility; individuals with advanced chronic renal failure; high-risk pregnant women; people of any age with severe obesity (BMI > 40); and medical conditions such as liver diseases. Moreover, it is possible that COVID-19 is an endothelial disease, which can lead to severe cases of coagulopathies and thromboses[9].

One of the pioneering studies in China in 2019, with a sample of 1099 individuals, revealed that about 23.7% had a coexisting disease. The value being modified to 38.7% for those who were classified as severe[3.] In the study developed at HIAE, the prevalence of chronic diseases was much higher in the group of hospitalized patients (50%) than in the non-hospitalized patients (15.2%). This prevalence is even higher in the subgroup admitted to the ICU (80%)[7.] This corroborates the findings of this study, in which SAH (50.3%), diabetes (35.5%) and obesity (27.2%) lead with the highest percentages.

Related to this, this same Brazilian study describes the chronic use of medicines, both in the general sample and in those who were hospitalized. In this last group, the highest prevalence of drugs was the antihypertensive class (25%), followed by statins (19.4%). In addition, it adds the amount of medicines used by the hospitalized group: 38.2% only one type of medicine; 11.8% two types of medicines; 17.6% three types of medicines and 32.4% four or more medicines (polypharmacy)[7]. In our study, patients admitted to ICU presented considerable use of medicines in a quantitative way, being stratified between: fewer than 5 medicines (39.1%) and equal to or greater than 5 medicines: (17.8 %). In this context, it is possible to hypothesize that individuals with higher number of co-existing diseases, consequently, use a greater number of medicines and tend to a worse evolution with the contagion of SARS-CoV-2.

Although the diagnosis of COVID-19 can only be confirmed by polymerase chain reaction (RT-PCR), chest CT can assist in the evaluation of the extent of the involvement, evolution of the disease and detection of possible complications, which makes this tool quite useful and valuable[11]. Pioneering studies conducted by the Chinese, as well as later by Brazilians, describe the typical pattern of COVID-19 infection. The most characteristic findings are those of multiple ground-glass opacities, predominantly in the periphery, posterior regions and pulmonary bases. Most of the time, bilateral and multilobar, and may evolve to a crazy paving pattern and in consolidations with the evolution of the infection[2,11]. A Chinese study, presented by Guan and collaborators, with a representative sample of 1099 individuals, about 86.2% presented abnormalities in CT, being 56.4% opaque in ground glass; 51.8% bilateral irregular shading; 41.9% local irregular shading and 14.7% interstitial abnormalities[3].

In Brazil, in HIAE, among the 510 individuals who composed the sample, 72 were hospitalized and 55 patients underwent chest CT. Of which 96.4% presented some abnormality, being 89.1% opaque in ground glass; 81.8% bilateral consolidations; 47.3% interstitial alterations; 1.8% focal consolidations. According to the specifications of the Radiological Society of North America (RSNA)[12], in which the reports of our institution were based, about 75.1% of the individuals present the characteristics described as a typical pattern.

As previously described, the CT findings differ according to the progression of the disease, presenting from the onset of symptoms. The following time classification has been proposed: Initial phase (0 to 4 days): ground-glass opacities; progression phase (5 to 8 days): progression of ground-glass opacities, appearance of crazy paving and consolidations; peak phase (9 to 13 days): prevalence of consolidations, which can also be found in ground glass and crazy paving, besides the possibility of the emergence of reticular opacities and parenchymal bands; absorption phase (after 14 days): reduction of consolidations, resolution of crazy paving areas,

and diffuse ground-glass opacities and reticular alterations may be present [13]. In addition, studies have proposed the use of chest CT to estimate the degree of pulmonary impairment, which may be through an automated quantitative or subjective visual score, in which the analysis is performed in the 5 pulmonary lobes, considering 0: absence of impairment; 1-25%: minimum; 26-50%: mild; 51-75%: moderate; 76-100%: severe or advanced[13]. In our study, the subjective visual analysis demonstrated most cases with mild (44.4%) and moderate (25.4%) impairment.

Extensive studies evaluating data from 1099 patients with confirmed COVID-19 indicate data that are important to be highlighted. The primary composite outcome, that is, ICU admission, use of VMI or death, occurred in 67 patients (6.1%), including 5% who were admitted to the ICU, 2.3% who underwent VMI and 1.4% who died[3]. In a Brazilian study, in HIAE, composed of 510 individuals, the need of IOT was verified in 23.6% of the patients. On the other hand, our study presented a high percentage of the procedure, resulting in 90.5%. In addition, after extubation in some cases, we counted those who suffered a new episode of IRpA and again needed VMI (3.6%) and those who were not eligible for the procedure (11.2%). The mean length of ICU stay at HIAE was 15.25 days, whereas in our study it was 10 days. What differs markedly is the mortality rate among the studies, in which the HIAE presented a rate of 1.38%, while this study exhibited 43.8% of deaths[7].

The present study had some limitations. Namely: Considerable transfer rate to other hospitals (23.7%); Incomplete information documented in medical records, including reported data regarding signs and symptoms; Patients or companions who have not been able to report associated diseases and/or which and how many continuous use medicines. These limitations are common in observational studies collected in medical records, taking into account that data generation was guided in clinical terms and not in a systematic way. In addition, it included only patients from a single hospital in southern Brazil, and no data from other institutions were documented.

4 Conclusion

Since the onset of the virus SARS-CoV-2 in 2019, it was observed a substantial increase in hospital admissions rates, demand for ICU beds and advanced respiratory support, generating a higher burden of health systems. The analysis of sociodemographic and clinical characteristics enables the determination of the profiles of individuals in a given region, which makes this study promising, since it generates information for planning and effective care coverage, in order to avoid mass contamination and overcrowding. Furthermore, this serves as a starting point for future research, searching for thus, actions which can minimize the impact caused by the disease and the damage caused by the current situation.

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