

EPIDEMIOLOGICAL PROFILE OF COVID-19 CASES AND DEATHS IN A REFERENCE HOSPITAL IN THE STATE OF GOIÁS, BRAZIL

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ABSTRACT

The pandemic caused by the Coronavirus 19 (Coronavirus disease 2019, COVID-19) killed countless people in 2020 and it arrived in Brazil in mid-February from the same year. It spread quickly, through its facilitated form of transmission by droplets of saliva, coughing, sneezing and contaminated surfaces. Several studies have indicated that male people over 60 years of age with comorbidities such as diabetes mellitus, chronic kidney disease, cardiovascular disease and/ or chronic lung diseases had higher rates of progression to Severe Acute Respiratory Syndrome and greater vulnerability to death. In this sense, this study aimed to describe the clinical and epidemiological profile from suspected and confirmed cases of COVID-19 in a hospital in the city of Anápolis, in the State of Goiás, Brazil, from March to December 2020. A total of 1,170 patients were included in this study, with 54.8% of the patients admitted with symptoms of COVID-19 were women (46.9%) aged between 30 and 59 years old. In addition, it was noted that 11.5% of these patients had some type of comorbidities. Furthermore, the data revealed that 82.2% of the laboratory-confirmed patients who died had comorbidities, most of them men (57%), and from the total of 68.5% had two or more comorbidities, with cardiovascular origin being the most frequent reaching 77.5% from the sample. Thus, it was concluded that the clinical-epidemiological profile of suspected and confirmed patients for COVID-19 in this research was characterized by the majority of female patients between 30 and 49 years of age, although most confirmed cases and deaths occurred in men older than 60 years of age. Most confirmed patients had two or more comorbidities, most of them of cardiovascular origin, followed by metabolic syndromes, lung diseases and others.

KEY WORDS: COVID-19; epidemiology; comorbidity.

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INTRODUCTION

The disease Coronavirus 19 or COVID-19 is caused by the severe acute respiratory syndrome virus 2 (SARS-CoV-2). This virus was initially detected in Wuhan, Hubei Province, China in December 2019 and quickly spread into a global pandemic, marking the third introduction of a virulent coronavirus into human society, affecting not only the healthcare system, but also the global economy. COVID-19 was declared an international public health emergency by the World Health Organization (WHO) on January 2020 and in Brazil it was considered a public health emergency in February, 2020 (Croda et al., 2020; Huang et al., 2020; WHO, 2020a).

The SARS-CoV-2 belongs to the *Orthocoronavirinae* family and encompasses several coronaviruses that can infect mammals and birds. The SARS-CoV-2 envelope comprises a lipid membrane and three structural components: the spike (S) glycoprotein, the envelope (E) protein and the membrane (M) protein. Within the viral envelope, the nucleocapsid protein involves the positive-sense single-stranded RNA. The SARS-CoV-2 infection begins when the viral spike (S) glycoprotein binds to angiotensin-converting enzyme 2 (ACE2) receptor on the host cell (Hoffmann et al., 2020; Perico et al., 2021). The transmission of SARS-CoV-2 occurs primarily by droplets, requiring close interpersonal contact and by fomites according to Wang & Lund (2020).

Regarding clinical manifestations, most cases are considered asymptomatic or have mild symptoms (85%) as nausea, headache, emesis, abdominal pain, diarrhea, odynophagia, rhinorrhea, anosmia and loss of taste. Severe cases (15%) may include the presence of pain, dyspnea, cyanosis, tachypnea, signs of respiratory distress, hypotension, decompensation of underlying diseases and lymphopenia, which require hospital treatment. The case fatality rate of patients with SARS-CoV-2 infection is lower than that of severe acute respiratory syndrome (SARS) and middle east respiratory syndrome (MERS) (Sun et al., 2020; WHO 2020b).

The clinical characteristics of COVID-19 patients and the disease severity may vary across studies from different countries. In Brazil, some studies have characterized the profile of cases and identified risk factors associated with deaths from COVID-19. These studies indicate that male sex, age over 65 years old with hypertension, low blood platelet count, the need for supplemental oxygen, invasive mechanical ventilation at admission, and oxygen saturation < 90% despite supplemental oxygen, were factors associated with a higher risk of death (Marcolino et al., 2021). Therefore, knowing the characteristics of patients hospitalized for COVID-19 with higher chances of serious complications, may offer subsidies to the health professionals and managers to develop strategies for this population group, due to the probabilities of complications related to the disease and hospital support demand (Pontes et al., 2022).

In this sense, the objective of this study was to analyze the epidemiological and clinical features and factors associated with mortality in patients with COVID-19 in a public hospital in the state of Goiás, Brazil.

METHODS

Patients and methods

This was a retrospective and descriptive study from all patients admitted in the Hospital Estadual Dr. Henrique Santillo (HEANA), with suspected or confirmed COVID 19, analyzing their profile and their health issues. The medical records and data from inpatients, with laboratory-confirmed COVID-19, reported between March 2020 and December 2020, were collected in the HEANA, in the city of Anápolis, Goiás [396,526 inhabitants/ Brazilian Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística* - IBGE) 2021]. The data collected of inpatients with COVID-19 consisted of epidemiological and clinical characteristics, comorbidities, and lethality outcome.

Were considered suspected cases of COVID-19 individuals with fever or flu-like symptoms such as cough, dyspnea, nasal or conjunctival congestion, sore throat, and runny nose, as well as contact with a suspected or confirmed person, in the last 14 days from admission. A confirmed case of COVID-19 was defined as a positive result on real-time RT-PCR assay of nasal and oropharyngeal swab specimens.

This study was approved by the Ethics Committee from the State University of Goiás (UEG) with protocol number 4.391.037.

Statistical analysis

Descriptive analysis, including calculation of average, median, standard deviation, and percentages, was performed in Microsoft Office Excel®. A chi-square test was used to assess the independent variables such as sociodemographic and clinical-laboratory data of COVID-19 patients in relation to death. Data were considered statistically significant when the p value was ≤ 0.05 .

RESULTS

From March to December 2020, a total of 1,170 cases were COVID-19 suspected at the State Hospital Dr. Henrique Santillo (HEANA). Among the suspected cases, 681 were from the city of Anápolis/ Goiás, and the remainder was from another 105 municipalities in Goiás or other States from Brazil.

In the distribution of suspected cases according to sex, 607 were female and 563 were male, with a mean age of 51.3 years old. The presence of comorbidities including mainly hypertension, obesity, diabetes, and previous lung problems was observed in 135 cases and 172 cases progressed to death. The laboratory confirmation of COVID-19 by RT-PCR was performed in 45,3% (n= 530) from the suspected cases. The Table 1 details the main characteristics of the cases.

Table 1. Clinical-epidemiological profile of suspected and confirmed cases of COVID-19 (n= 1,170) at Hospital Estadual de Anápolis Dr. Henrique Santillo (HEANA), Goiás, from March to December 2020.

	Confirmed COVID-19 n	Unconfirmed COVID-19 n	Total n	*p-value
Gender				<0.0001
Female	253	388	641	
Male	277	252	529	
Age (years)				<0.0001
≤17	4	4	8	
18-29	51	138	189	
30-59	229	320	549	
≥60	246	178	424	
Presence of comorbidity	111	24	135	NA
Death	135	37	172	NA

* Chi-square test. NA: Not applicable

In our study, we observed a greater number of suspected cases (n= 640) in relation to the number of confirmed cases (n= 530). This result can be considered expected at a time of large number of cases and by the criteria used for suspected and confirmed cases. The criteria for suspected cases were fever or flu-like symptoms such as cough, dyspnea, nasal or conjunctival congestion, sore throat, and runny nose, as well as any contact with a suspected or confirmed person in the last 14 days. On the other hand, cases were confirmed by positive result on real-time RT-PCR assay of nasal and oropharyngeal swab specimens. In this sense, we consider expected the number of suspected cases to be higher than the number of confirmed cases. Furthermore, an important correlation exists between the proportions of death, in which a greater number was observed among confirmed cases (25,5%; 135/530) compared to suspected cases (5,8%;

37/640). Among patients with laboratory-confirmed COVID-19 (n= 530), the mean age was 56 years old and 25.5% (n= 135) died. Among those who died, 45 were female and 90 were male. Already among the discharged cases (n= 395), the majority were female (n= 208). Regarding age, 84.4% (114/135) of patients who died were 60 years old or older ($p < 0.0001$), and the mean age was 70.5 years old. Among the patients who were discharged, 53.4% (n= 211) were aged between 30 and 59 years old, and the mean age was 51.3 years old. When we evaluated the death outcome between genders, the statistical analysis showed that there was a significant difference between genders and age ($p < 0.0001$) (Table 2).

Table 2. Factors associated to the outcome discharge and death in patients with laboratory confirmed COVID-19 (n= 530).

	Discharge n	Death n	Total n	p-value
Gender				0.0001
Female	208	45	253	
Male	187	90	277	
Age (years)				<0.0001
≤17	4	-	4	
18-29	48	3	51	
30-59	211	18	229	
≥60	132	114	246	

The comorbidity data were collected only for patients who died. Due to this study limitation, we analyzed the presence, number and types of comorbidities among gender, as shown in Table 3.

Among the patients who died (n= 135), most had comorbidities ($p = 0.1604$). The presence of more than one comorbidity was observed in 68.5% of cases (76/111). For the analysis, comorbidities were grouped into types, such as cardiovascular, metabolic, pulmonary, and others. Cardiac comorbidities included hypertension, heart failure, or some other type of heart disease. Among the metabolic comorbidities, most were diabetes mellitus and obesity. Among the pulmonary ones, the majority were chronic obstructive pulmonary disease (COPD) and asthma. Other comorbidities were grouped and included neurological problems, neoplasms, autoimmune diseases, and chronic infections.

Table 3. Comorbidities between gender in patients with laboratory-confirmed COVID-19 who died (n= 135).

	Female n	Male n	Total n	p-value
Presence of comorbidity				0.1604
Yes	34	77	111	
No	11	13	24	
Total	45	90	135	
Number of comorbidities				0.3768
One	13	22	35	
Two or more	21	55	76	
*Type of comorbidity				
Cardiovascular				0.6226
Yes	25	61	86	
No	9	16	25	
Metabolic				>0.9999
Yes	16	37	53	
No	18	40	58	
Pulmonary				>0.9999
Yes	7	16	23	
No	27	61	88	
Others				0.8087
Yes	7	19	26	
No	27	58	85	

* Comorbidities were counted according to the type and the number of patients with multiple comorbidities, who were included in more than one category.

Among the confirmed cases of COVID-19, the majority of patients who died had more than one comorbidity (76/111). The cardiovascular comorbidity was the most frequent (p= 0.6226), represented in most cases by hypertension. There was no significant difference between the presence of other types of comorbidities among patients who died.

DISCUSSION

This is one of the first studies exploring the characteristics of patients diagnosed with COVID-19, in a referral hospital, in the first year of the pandemic, in Anápolis, a large city in the center-west region of Brazil. Therefore, the profile of the population most associated with deaths, according to this study, comprises men, over 60 years old, with comorbidity, mainly cardiovascular disease, corroborating with Pontes et al. (2022), that also found the same profile of people who evolved to death in their study.

However, females reached the highest number of hospitalizations, corresponding to 55% of women among the 1,170 people who were admitted between March and December 2020 with suspected COVID-19. Among the laboratory-confirmed cases, the majority were male (52%). Accordingly, Marcolino et al. (2021) in the Brazilian States of Minas Gerais, Rio Grande do Sul and São Paulo, which evaluated 2,054 patients confirmed for COVID-19, showing in their results that 52.6% of cases were male.

Besides that, it was possible to evaluate that the male sex had a higher number of hospitalizations and deaths (more than half in both), which was also observed in the study of Das Mercês et al. (2020). By that, it is believed that the estrogen hormone may have a relationship with the immunity factor, since it can stimulate aspects that are important to eliminate viral infections and respond well to vaccines (Silva et al., 2021).

It is known that sex hormones are immunomodulators and that their different concentrations in men and women can influence the viral load of tolerant women, their clinical manifestations and their morbidity and mortality. This is because estrogen, subtype 17 β -estradiol (E2), promotes a stronger immune response in women by acting on the regulation and control of T and B lymphocytes, in the recruitment of monocytes, in the exclusion of pro-inflammatory cytokines and in the presentation of antigens (Reis et al., 2021; Silva et al., 2021).

Furthermore, it is known that angiotensin-converting enzyme 2 (ACE2) is critical in COVID-19 infection, as it is used by the virus as an entry receptor into target cells. Thus, high concentrations of estrogen decrease the availability of this enzyme. Meanwhile, low concentrations of these hormones in the body, associated with high testosterone levels, increase the expression of the enzyme and, consequently, its binding to SARS-CoV-2 (Reis et al., 2021).

As for the lethality found in this study in Anápolis, it was possible to identify a low lethality rate when compared to the studies by Sousa (2022), showing a number of 25%. In 2020, from the 1,170 people admitted into the hospital 172 died, corresponding to almost 15% of cases.

In the present study, data collection on comorbidities was performed only among patients who evolved to death. Therefore, it was not possible to analyze the risk of evolution to death among confirmed cases with or without comorbidities. Among the patients who evolved to death, 82.2% had some type of comorbidity, 31.5% had only one type and 68.4% had two or more types, with the largest prevalence of cardiovascular, metabolic and pulmonary comorbidities.

It was also observed that patients with more than one comorbidity, mainly cardiovascular and pulmonary, progressed to death, compared to patients with only one or no comorbidity. Thus, it is possible to perceive a pattern of comorbidities, since in the Marcolino et al (2021) and Pontes et al. (2022) studies, cardiovascular causes were especially found. In a more national view, seen in the 2020 study by Souza, the proportions of the general Brazilian population with cardiovascular disease and diabetes are 4.2 and 6.2%, respectively.

In addition, older age groups tend to have a higher proportion of comorbidities than younger age groups in different outcomes, showing that even in a smaller sample, the pattern is reproduced in this study. Cardiovascular comorbidities were predominant among the patients evaluated, in addition to being more present in men. Such data are in line with the study by Marcolino et al. (2021) and with that of Pontes et al. (2022), which also points out the cardiovascular diseases as the main comorbidities associated with death from COVID-19.

The present study showed that the regional profile of COVID-19 cases in 2020 in a medium and high complexity hospital in Anápolis, Goiás was in accordance with the national profile. Among the limitations of this study, we highlight the lack of data from comorbidities among discharged cases. In addition, data analysis after the implementation of vaccines (2021) would allow observing the change in the profile of cases and even a possible comparison in the pre- and post- vaccine setting.

The profile of confirmed cases for COVID-19 in the study was men, predominantly the age group over 60 years old and who had comorbidities, mainly hypertension and diabetes. Although the profile with more admissions of suspected cases of COVID-19 in the analyzed hospital was predominantly female, between 30 and 59 years old, the deaths mostly occurred in men, over 60 years old, in the presence of two or more comorbidities, mainly metabolic and cardiovascular. It is noteworthy that, although most admissions were from Anápolis city, there was a range of patients from other cities and even from outside the state.

In this way, it is noticeable that only in the long term will it be possible to analyze in depth the consequences and inferences of COVID-19, and what the predominant epidemiological profile, which provided a scenario of instability in health, with overcrowding of hospitals and several deaths. Thus, more research is needed on the course of the disease and the variation of the profile of the affected cases over the years, since the knowledge of the population at higher risk allows the establishment of prophylaxis and more targeted treatment measures.

CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest to disclose.

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