Clinical-epidemiological profile of patients with death from COVID-19 in a Brazilian hospital

Perfil clínico-epidemiológico de pacientes com desfecho de óbito por COVID-19 em hospital brasileiro

Perfil clínico-epidemiológico de pacientes con muerte por COVID-19 en un hospital brasileño

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REVISA

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RESUMO

Objetivo: Identificar o perfil epidemiológico de pacientes internados que evoluíram para óbito por COVID-19 em um município do Nordeste brasileiro. Métodos: Estudo transversal, realizado por meio de um instrumento para coletar os dados epidemiológicos e clínicos de pacientes internados em um hospital público em decorrência da COVID-19. A amostra final compreendeu 134 pacientes. Para a análise de dados, utilizou-se a estatística descritiva. O teste de Shapiro-Wilk foi utilizado para verificar a normalidade dos dados. Resultados: Houve a predominância do sexo feminino (57,2%), com uma mediana de 71 anos. As manifestações clínicas mais frequentes foram saturação de O2 < 95% (73,9%) e dispneia (67,9%). A doença cardiovascular crônica (54,5%) foi a principal morbidade. Conclusão: O estudo possibilitou traçar o perfil epidemiológico de pacientes internados que evoluíram para óbito devido à COVID-19 nos anos de 2020 e 2021 em um município na região nordeste do Brasil. Contribui para auxiliar gestores de saúde da região ao planejar medidas preventivas e tomar decisões. Além disso, fornece subsídios para um monitoramento epidemiológico efetivo, permitindo uma resposta ágil em caso de uma nova onda de COVID-19

Descritores: COVID-19; Epidemiologia; Hospitalização; Pandemias; Perfil de Saúde.

ABSTRACT

Objective: To identify the epidemiological profile of hospitalized patients who died from COVID-19 in a municipality in the Brazilian Northeast. Methods: Cross-sectional study, carried out using an instrument to collect epidemiological and clinical data from patients admitted to a public hospital due to COVID-19. The final sample comprised 134 patients. For data analysis, descriptive statistics were used. The Shapiro-Wilk test was used to verify data normality. Results: There was a predominance of females (57.2%), with a median of 71 years old. The most frequent clinical manifestations were O2 saturation < 95% (73.9%) and dyspnea (67.9%). Chronic cardiovascular disease (54.5%) was the main morbidity. Conclusion: The study made it possible to trace the epidemiological profile of hospitalized patients who died due to COVID-19 in 2020 and 2021 in a municipality in the northeast region of Brazil. It helps to assist health managers in the region when planning preventive measures and making decisions. Furthermore, it provides support for effective epidemiological monitoring, allowing for an agile response in the event of a new wave of COVID-19.

Descriptors: COVID-19; Epidemiology; Hospitalization; Pandemics; Health Profile.

RESUMEN

Objetivo: Identificar el perfil epidemiológico de los pacientes hospitalizados que fallecieron por COVID-19 en un municipio del Nordeste brasileño. Métodos: Estudio transversal, realizado mediante un instrumento de recolección de datos epidemiológicos y clínicos de pacientes ingresados en un hospital público por COVID-19. La muestra final estuvo compuesta por 134 pacientes. Para el análisis de los datos se utilizó estadística descriptiva. Se utilizó la prueba de Shapiro-Wilk para verificar la normalidad de los datos. Resultados: Hubo predominio del sexo femenino (57,2%), con una mediana de 71 años. Las manifestaciones clínicas más frecuentes fueron saturación de O2 < 95% (73,9%) y disnea (67,9%). La enfermedad cardiovascular crónica (54,5%) fue la principal morbilidad. Conclusión: El estudio permitió rastrear el perfil epidemiológico de los pacientes hospitalizados que fallecieron por COVID-19 en 2020 y 2021 en un municipio de la región noreste de Brasil. Ayuda a los gestores de salud de la región a planificar medidas preventivas y tomar decisiones. Además, brinda apoyo para un seguimiento epidemiológico eficaz, permitiendo una respuesta ágil en caso de una nueva ola de COVID-19.

Descriptores: COVID-19; Epidemiología; Hospitalización; Pandemias; Perfil de Salud.

ORIGINAL

Introduction

COVID-19 is a disease caused by the SARS-CoV-2 betacoronavirus, identified in late December 2019 by Chinese health authorities, who reported an outbreak of pneumonia of unknown origin in Wuhan, Hubei province, China. On March 11, 2020, the World Health Organization (WHO) declared the spread of COVID-19 a global pandemic. In Brazil, the Ministry of Health (MoH) established the state of community transmission on March 20, 2020[1].

Transmission of the disease occurs through several modes, including direct contact, droplets, aerosols, fomites, and the fecal-oral route. The most common form of transmission is through coughing, sneezing, talking, and inhalation of droplets, aerosols, as well as by contact with contaminated surfaces, followed by contact with oral, nasal, or ocular mucous membranes. Elimination of the virus occurs through the respiratory tract, saliva, feces, and urine, resulting in other sources of spread. The incubation period of the disease ranges from 1 to 14 days, usually from 3 to 7 days, and in some cases can extend up to 24 days, which complicates the screening of infections. In addition, there are individuals who are asymptomatic [2].

As preventive measures, it is recommended to adopt social distancing, perform hand hygiene with soap and water or alcohol, and wear a mask. The diagnosis can be clinical, through clinical-epidemiological investigation, anamnesis, and physical examination, taking into account the presence of signs and symptoms characteristic of COVID-19. In addition, it can be performed in the laboratory, using molecular biology tests, serology or rapid tests, and by imaging, through Computed Tomography (CT)[3]. The most frequent clinical manifestations of COVID-19 include fever, cough, fatigue, sputum production, shortness of breath, sore throat, headache, and gastrointestinal symptoms such as diarrhea and vomiting. Complications include sepsis, respiratory failure, Acute Respiratory Distress Syndrome (ARDS), heart failure, and septic shock. Thus, the clinical presentation can range from mild to severe, and can be fatal. COVID-19 affects several organs of the body, such as the lungs, heart, kidneys, gastrointestinal, and central nervous system, and can result in multiple organ failure [2].

At present, antiviral treatment with Paxlovid™ is available(4). Before the drug existed, the therapeutic approach consisted mainly of symptomatic support measures, which included maintaining hydration and nutrition, controlling fever and cough. For patients with severe infection or respiratory failure, interventions such as inhalation of oxygen through a mask, high-flow inhalation of nasal oxygen, non-invasive ventilation (NIV), or invasive mechanical ventilation (IMV) may be required. If these measures are not effective, extracorporeal membrane oxygenation (ECMO) may be considered. With the development of vaccines, immunization has become the most effective approach to control the transmission of the disease and reduce its severity [2].

As of November 12, 2023, Brazil had a cumulative of 37,994,356 confirmed cases and 706,986 deaths. In the state of Rio Grande do Norte, 592,681 confirmed cases and 9,165 deaths[5]. As of November 12, 2023, Brazil had a cumulative of 37,994,356 confirmed cases and 706,986 deaths. In the state of Rio Grande do Norte, 592,681 confirmed cases and 9,165 deaths.

Method

This is a cross-sectional study, with a quantitative and documentary approach, carried out in a public referral hospital for COVID-19, with 28 clinical and 20 intensive beds, linked to the State of Rio Grande do Norte, Brazil, from May 2020 to December 2021.

The population consisted of patients hospitalized at the aforementioned institution who died from COVID-19. The sample selection followed a non-probabilistic and convenience approach, corresponding to COVID-19 deaths. The period for analysis in this study began in May 2020, when the municipality in question confirmed the first case of the disease.

To determine the sample size, we analyzed the notified data publicly disclosed by official bodies on social networks. A total of 8,264 suspected cases of COVID-19 were reported from March 7, 2020 to December 27, 2021, of which 1,807 were confirmed. There were 1,880 hospitalized patients, of whom 169 died. Therefore, the initial study sample consisted of 169 patients.

Data from the individual registry form of cases of Severe Acute Respiratory Syndrome that were in the Hospital Epidemiological Surveillance Center of this institution, made available by the Brazilian Ministry of Health, were used. Information on patients of all ages and of any gender who died as a result of COVID-19 was included. Records with inconclusive data were excluded from the sample. It was evidenced during the survey of the records that 15 deaths occurred in other places and 20 were not located in the Hospital Epidemiological Surveillance Center. Thus, the final sample consisted of 134 patients.

Data were collected using an instrument developed by the researchers with the following variables: sociodemographic profile (gender, race/color, area, region, education and occupation) and clinical profile (signs and symptoms, risk factors, COVID-19 vaccine, type of vaccine, vaccine schedule, date of vaccination, ventilatory support, x-ray, x-ray result, CT scan, CT scan, type of sample, form of diagnosis, closure criteria, case evolution, days between the first symptoms and the date of death, days between the first symptoms and hospitalization, days between the date of vaccination and death, days between the date of vaccination and the date of symptom onset, days between vaccination and hospitalization, days of ICU stay, days between the first symptoms and the day of test collection).

Data collection took place at this institution, after the signing of the institutional consent letter and approval by the Research Ethics Committee of the Trairi School of Health Sciences, Federal University of Rio Grande do Norte, under opinion number 5.242.840 and CAAE number 55490722.7.0000.5568. Data collection was performed by a researcher from the research team. The time spent for data collection on the forms was approximately eight minutes each.

Some biases may bring limitations to this type of study, as it is a documentary research, such as: inaccuracy of data and records and loss of important information[6]. Thus, incomplete forms or those with ignored information related to the evolution of the case were excluded as a strategy to reduce possible biases.

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 20.0. For the descriptive analysis, frequencies and measurements of the distribution center and their variabilities were considered. The Shapiro-Wilk test was used to verify the normality of the data.

Results

Among the 134 patients analyzed, females predominated in the sample (57.2%), and most of them were white (69.8%). There was a predominance of individuals living in the urban area (97.8%). Regarding the level of education, the majority had less than eight years of schooling (14.2%) and only 6.7% had completed an undergraduate degree. 23.1% of the sample had a paid occupation.

Regarding age, the sample ranged from 30 to 95 years, with a median of 71 years. The highest mortality was in the age group of 80 to 89 years (24.6%), followed by 70 to 79 years (21.6%) and 60 to 69 years (18.6%), as described in Table 1.

Table 1- Characterization of sociodemographic data of patients hospitalized for COVID-19. Brazil, 2022 (n=134)

Variables	N (%)
Sex	
Female	70 (57,2)
Male	64 (47,8)
Colour*	
White	81 (69,8)
Brown	20 (17,2)
Black	15 (12,9)
Zone*	
Urban	131 (97,8)
Rural	2 (1,5)
Region*	
North	39 (29,1)
Central	39 (29,1)
West	19 (14,2)
East	17 (12,7)
South	15 (11,2)
Rural	4 (3,0)
Schooling*	
Illiterate	9 (6,7)
Incomplete elementary school	19 (14,2)
Complete elementary school	13 (9,7)
Middle school	10 (7,5)
Higher education	9 (6,7)
Occupation*	
Retired	30 (22,4)
Gainful activity	31 (23,1)
From home	13 (9,7)
Healthcare professional	2 (1,5)
No activity	1 (0,7)
Age group	
30 - 39 years old	6 (4,5)
40 - 49 years old	15 (11,2)
50 - 59 years old	18 (13,4)
60 - 69 years old	25 (18,6)
70 - 79 years old	29 (21,6)

80 - 89 years old					33 (24,6)		
90 - 99 years old					8 (6,0)		
Variáveis							
	Mean	**SD**	**Median**	**Minimum**	**Maximum**	**CI95%**	**Valor de p[1]**
Age**	68,37	15,66	71,00	30,00	95,00	[65,70; 71,05]	0,01

*Missing data; **in years; SD: standard deviation; CI: confidence interval; 1Shapiro-Wilk test
Source: Prepared by the authors.

The main symptoms identified were O2 saturation < 95% and dyspnea (73.9%), followed by cough (67.9%), respiratory distress (60.4%) and fever (58.2%) (Table 2).

Table 2. Characterization of the signs and symptoms of hospitalized patients who died from COVID-19. Brazil, 2022 (n=134)

Variables	N (%)
O2 saturation < 95%*	99 (73,9)
Dyspnoea*	99 (73,9)
Cough*	91 (67,9)
Respiratory distress*	81 (60,4)
Fever*	78 (58,2)
Sore throat*	18 (13,4)
Diarrhoea*	15 (11,2)
Fatigue*	13 (9,7)
Loss of taste*	8 (6,0)
Loss of smell*	7 (5,2)
Puke*	7 (5,2)
Headache*	5 (3,7)
Myalgia*	5 (3,7)
Abdominal pain*	3 (2,2)
Tachydyspnea*	3 (2,2)
Asthenia*	2 (1,5)
Runny nose*	2 (1,5)
Peripheral cyanosis*	1 (0,7)
Convulsion*	1 (0,7)
Hypoglycemia*	1 (0,7)
Inappetence*	1 (0,7)
Respiratory insufficiency*	1 (0,7)
Sleepiness*	1 (0,7)
Dizziness*	1 (0,7)

*Dados ausentes

The risk factors and comorbidity of the patients are shown in Table 3. Chronic cardiovascular disease was present in most patients (54.5%), followed by diabetes mellitus (36.6%) and obesity (9.0%).

Table 3. Risk factors and comorbidities in patients hospitalized for COVID-19. Brazil, 2022 (n=134)

Variables	N (%)
Chronic cardiovascular disease*	73 (54,5)
Diabetes mellitus*	49 (36,6)
Obesity*	12 (9,0)
Chronic lung disease*	6 (4,5)
Chronic kidney disease*	5 (3,7)
Chronic neurological disease*	4 (3,0)
Immunodeficiency/immunosuppression*	4 (3,0)
Neoplasm*	4 (3,0)
Asthma*	2 (1,5)
Arthrosis*	1 (0,7)
Chronic haematological disease*	1 (0,7)
Lupus*	1 (0,7)
Frailty syndrome*	1 (0,7)
Smoking*	1 (0,7)
Mental disorder	1 (0,7)

* Missing data

In the sample of patients who died, only 17.9% had been immunized with the COVID-19 vaccine. CoronaVac® was the most frequent type of vaccine in individuals (9.7%). The two-dose vaccination schedule was the most prevalent (11.2%). It is worth noting that vaccination in the municipality under study began on January 19, 2021 and, consequently, resulted in a decrease in the number of deaths. IMV was the ventilatory support was evidenced in the sample (47.8%). Regarding imaging studies, chest X-rays were performed in 3.7% of the patients, and 3.0% had normal results. CT was performed by 56.7%, where 55.2% obtained the result as typical for COVID-19. It was observed that 64.9% of the patients were admitted to the ICU and died, as shown in Table 4.

Table 4. Clinical data related to vaccination and testing for COVID-19. Brazil, 2022 (n=134)

Variables	N (%)
COVID-19 Vaccine*	
Yes	24 (17,9)
No	13 (9,7)
Not applicable	97 (72,4)
Type of Vaccine*	
CoronaVac®	13 (9,7)
Oxford	9 (6,7)
Jansen	1 (0,7)
Not applicable	98 (73,1)
Vaccination schedule*	
One serving	8 (6,0)
Two doses	15 (11,2)
Not applicable	98 (73,1)
Ventilatory support*	
Yes, invasive	64 (47,8)
Yes, non-invasive	53 (39,6)
No	4 (3,0)
Radiography*	
Yes	5 (3,7)
No	24 (17,9)

Radiography result*	
Normal	4 (3,0)
Interstitial infiltrate	1 (0,7)
Not applicable	26 (19,4)
Tomography*	
Yes	76 (56,7)
No	18 (13,4)
CT scan evaluation	
Typical COVID-19	74 (55,2)
Undetermined COVID-19	1 (0,7)
Atypical COVID-19	1 (0,7)
Not applicable	18 (13,4)
ICU admission*	
Yes	87 (64,9)
No	38 (28,4)

*Missing Data

Regarding the diagnosis of the patients, the sample for the detection of COVID-19 was collected from 97.0% of the individuals, 67.2% of which were nasopharyngeal secretions, 0.7% post-mortem tissue, and 20.1% were other types. It is identified that 61.2% of the patients were detectable for COVID-19 through RT-PCR. The rapid swab was used to detect 11.9% of the patients. The capillary test was used to detect 21.6% of the patients. Serology was detectable in 2.2% of the patients who died. The majority of the case closure criteria were laboratory (58.2%), followed by clinical-imaging (3.0%) and clinical (0.7%).

According to Table 5, the median number of days between the first symptom and death was 17.50 days; between the first symptom and hospitalization, 8.00 days; between hospitalization and death, 10.00 days. For those who received vaccination, the mean number of days between vaccination and the first symptom was 98.81 days (± 66.86); between vaccination and hospitalization was 103.45 days (± 68.33); between vaccination and death was 120.14 days (± 69.58). The median length of stay in the ICU was 10.00 days and the median time between the first symptom and the date of test collection was 5 days.

Table 5. Relationship between symptom, vaccination, death, RT PCR collection, and length of ICU stay. Brazil, 2022 (n=134)

Variables	Mean	SD	Median	Minimum	Maximum	IC 95%	Valor p[1]
Days between first symptom and death*	20,10	11,37	17,50	2,00	55,00	[18,14; 22,06]	0,000
Days between first symptom and hospitalization*	8,21	4,26	8,00	1,00	22,00	[7,47; 8,95]	0,001
Days between the date of admission and death*	12,79	10,25	10,00	1,00	48,00	[11,01; 14,56]	0,000
Days between vaccination and first symptom*	98,81	66,86	85,00	6,00	239,00	[68,37; 129,25]	0,146
Days between vaccination and	103,45	68,33	88,50	11,00	242,00	[71,47; 135,43]	0,104

hospitalization*							
Days between vaccination and death*	120,14	69,58	113,00	18,00	265,00	[88,47; 151,82]	0,178
Days of ICU stay*	12,00	7,90	10,00	3,00	36,00	[9,28; 14,72]	0,000
Days between the first symptom and the date of test collection*	6,45	3,71	5,00	1,00	21,00	[5,80; 7,10]	0,000

*Missing data; SD: standard deviation; 1 Shapiro-Wilk test

Discussion

This study revealed that most of the individuals who died were white, a similarity observed in other studies[7]. Regarding gender, there was a predominance of females, in contrast to other studies that indicate a higher probability of death in males[8-9]. This fact could be related to the profile of the city's population, which is composed of more women (51.6%). However, it was observed in another study in the same region of Brazil that 51.6% of the population was composed of women, but mortality in men was higher [10-11].

Urban residents were the most affected by the unfavorable outcome, in line with the findings of a study conducted in the southeastern region of Brazil, which analyzed the sociodemographic and clinical characteristics associated with the clinical outcome of hospitalized patients diagnosed with COVID-19 in a private institution[12]. Rural areas, being far from urban centers, favor social distancing, emerging as an effective preventive measure against infection and/or death from the coronavirus, as it reduces interactions in a community[13].

The level of schooling of less than eight years predominated in the sample. This trend can be explained by the majority of the affected population being elderly and by the location in the Northeast region of Brazil, where access to education was historically challenging, mainly concentrated in large cities. As a result, the level of education is expected to be lower. This same pattern was identified in a study conducted in southern Brazil [14].

Regarding occupation, most individuals were engaged in paid activities or were retired. A study indicated that the economically active population was the most affected, probably due to the need to work to ensure survival, and the other retirees, possibly due to the predominance of the elderly [15].

The results of this study demonstrate that the pandemic has had an even greater impact on the elderly population. Individuals aged between 60 and 99 years accounted for 70.9% of the registered deaths, with a median of 71.00 years. These findings corroborate national and international surveys, which indicate that the elderly population is more susceptible to mortality, with the age groups of 60 to 69 years (24.8%), 70 to 79 years (24.8%) and 80 years or older (23.1%) of deaths, with a mean of 80 years, respectively [16-17].

Aging represents a marker of the gradual accumulation of permanent damage throughout life and, consequently, is linked to the emergence of chronic diseases, as well as the fragility of the immune system in recognizing

pathogens, activating warning and release signals, as well as a chronic increase in inflammation [15].

Among the main symptoms identified in the study, O2 saturation < 95%, dyspnea, cough, respiratory distress and fever stand out. These findings are in line with the literature [11].

According to the Centers for Disease Control and Prevention (CDC), the main comorbidities associated with hospitalization are cardiovascular disease, obesity, and diabetes[2]. These data corroborate the present study, which identifies these risk factors as the most prevalent.

A study showed that the percentage of those not vaccinated against COVID-19, both for hospitalized individuals and among fatal victims of the disease, was higher than 50%, coinciding with the findings of this study, where 73.1% of participants did not receive the vaccine[18]. The distribution of vaccination was uneven in the different regions of Brazil. Even with the identification of three waves, the spread of the pandemic was observed in the North Region and, later, in the Northeast. This results in slower vaccination coverage in these regions, with percentages below the national average [19].

Another study indicated that most hospitalized patients required ventilatory support, and 14% underwent IMV[11]. The results of this study also demonstrated that ventilatory support was widely used, however, the IMV utilization rate was higher, reaching 47.8%. Acute respiratory failure is the main cause of hospitalization of critically ill COVID-19 patients and can progress to ARDS, and IMV is an essential support measure in these cases [14].

Chest X-rays showed normal results in most cases, which suggests that, at the time of the examination, the individuals had mild forms of the disease. On the other hand, the typical CT pattern for COVID-19 includes ground-glass opacities, often bilateral, diffuse, mosaic paving, and parenchymal consolidations [20].

Um A study identified that 69% of CT scans performed in patients with negative RT-PCR results presented typical results, with a final diagnosis of COVID-19[21]. Other studies recommend chest CT due to its high sensitivity (98%) compared to RT-PCR (71%), suggesting that CT can be considered an effective method for diagnosing COVID-19[22]. Therefore, it is essential in cases of false negative RT-PCR results or when sample collection occurs outside the ideal period. In addition, the importance of critically evaluating the findings of the exams together with the patient's clinical condition is highlighted [21].

Regarding the maximum length of stay in the ICU, the present study recorded a period of 36 days, similar to a study conducted in a public hospital that recorded 28 days [8].

The median time interval between the onset of the first symptom and death was 17.5 days, while a study in China recorded a median of 14.5 days. Regarding the mean period from the onset of the disease to hospitalization, the present study revealed a median of 8 days, compared to 6 days in the Chinese study [23].

A systematic review highlighted that in symptomatic and confirmed COVID-19 individuals, evidence of mortality was generally scattered and had low or very low levels of certainty for all WHO-approved vaccines except Janssen, which likely reduces the risk of all-cause mortality [24].

A study involving older adults aged ≥ 70 years vaccinated with the Oxford vaccine demonstrated that efficacy against symptomatic COVID-19 was

60% between days 28 to 34 after vaccination, increasing to 73% from day 35 onwards. In addition, a protective effect of 43% was observed in reducing hospital admissions[25].

A limitation of this study was the data collection performed using the SARS form, i.e., using secondary data, the form was filled out on the day of admission and should be updated throughout the hospitalization. This fact may have contributed to incomplete or missing information in the forms, due to the overload experienced by workers throughout the COVID-19 pandemic.

It is necessary to continue studies that enable a detailed analysis of cause and effect relationships, especially in the outcome of death, with a focus on the immunization of the population after booster doses. This study is clinically relevant, as it presents unprecedented data on the reality of the Brazilian Northeast. In addition, they are useful for health managers in the region to plan preventive measures and decision-making regarding the development of immunization strategies.

In addition, the study provides subsidies for effective epidemiological monitoring, allowing an agile response in the event of a new wave of COVID-19. This, in turn, contributes to offering adequate treatment to infected patients, with the aim of reducing the occurrence of severe forms of the disease and, thus, preventing death.

Conclusion

The data presented made it possible to outline the epidemiological profile of hospitalized patients who died due to COVID-19 in 2020 and 2021 in a referral hospital in the state of Rio Grande do Norte, in the northeast region of Brazil. A higher frequency of the disease was observed among women and the elderly. The most common clinical symptoms were O2 saturation below 95% and dyspnea, with chronic cardiovascular disease being the most prevalent risk factor. In view of the findings of the present study, it is observed that the elderly and female population should have more care and strict control over preventive health practices related to COVID-19.

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