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Clinical characteristics of 1544 Brazilians aged 60 years and over with laboratory evidence for SARS-CoV-2

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ABSTRACT

Introduction: Infection with the new coronavirus responsible for Severe Acute Respiratory Syndrome (SARS-CoV-2) continues to spread worldwide. In Brazil, there are already more than 230 thousand dead, many of these older adults.

Objective: To present the clinical characteristics of older Brazilian adults infected by COVID-19, in the epidemiological weeks (EW) 34-52, and to verify factors responsible for the increased risk of death.

Methods: Retrospective and observational study conducted with secondary publicly available data, provided by the Brazilian Ministry of Health. 1,544 confirmed cases of registered COVID-19 infection were included between August 16 and December 26, 2020, aged 60 or older. Outcomes: Demographic data, comorbidity, symptoms for disease, clinical information: days of hospitalization, chest X-ray, type of RT-PCR.

Results: 48% of patients admitted to the ICU with evidence for SARS-CoV-2 died. Symptoms and comorbidities related to increased chance of death (OR) were immunodeficiency (188%), kidney disease (166%), neurological disease (103%), dyspnea (86%), pneumopathy (55%), O2 saturation <95% (53%), respiratory discomfort (49%), age (36%), sore throat (31%), and sex (0.5%). There was a 5% increase in the chance of death for each year of life.

Conclusion: Heart disease and Diabetes mellitus were the most frequent comorbidities, but did not indicate an increased risk of death from SARS-CoV-2 infection. Age, sex, sore throat, dyspnea, respiratory discomfort, O2 saturation <95%, neurological disease, pneumopathy, immunodeficiency, and kidney disease were significantly associated with risk of death from COVID-19.

1. Introduction

Currently, no country in the world has escaped the COVID-19 pandemic, and they are also experiencing enormous pressure on the functioning of the health system (Weinstein & Skinner, 2020). For this reason, every day, tens of thousands of people are infected by the virus, and hundreds of deaths are recorded (WHO, 2020). In Brazil, between March and December 2020, approximately 200 thousand people died from Severe Acute Respiratory Syndrome (SARS-CoV-2). It is known that advanced age is significantly correlated with COVID-19. Comorbidities are common among older adults (Zhang et al., 2020; Sun et al., 2020), increasing the chance of infection, worsening respiratory failure, and death (Liu et al., 2020).

Current studies have described the epidemiological, clinical, and predictive characteristics of mortality of patients hospitalized with COVID-19 in an intensive care unit (ICU) (Ruan, Yang, Wang, Jiang, & Song, 2020; Wang et al., 2020). Among the pre-existing diseases, the most common highlighted were hypertension and Diabetes mellitus, followed by chronic obstructive pulmonary disease, kidney, liver, cancer, asthma, stroke, and immunodeficiencies. A systematic review and meta-analysis on the prevalence of comorbidities and mortality in patients hospitalized for SARS-CoV-2 identified a significant number, attesting to a total of 16,222 types of comorbidities (Espinosa et al., 2020). Considering that there are similarities among people who died of COVID-19 in the world in relation to their pre-existing diseases, this study aimed to: 1) present the clinical characteristics of older adult Brazilians infected by COVID-19, in the epidemiological weeks (EW) 34-52, and 2) to verify the predictive variables of the death of this population.

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2. Methods

2.1. Study design and participants

This is a retrospective observational study carried out with secondary data of public access, released on the Brazilian Ministry of Health (MH) online database, Sivep-Gripe (Brasil, 2021a), which waives the approval of the Ethics Committee according to Resolution n° 466/12 and Resolution no. 510/16, Brazil (Brasil, 2021b). This information is published daily, summarizing the notifications of cases of COVID-19 in the national territory, including deaths. Inclusion criteria were: confirmed cases of SARS-CoV-2 infection, age ≥60 years, both sexes, ICU registration, with or without death, time cut from EW 34-52 (August 16 and December 26 2020). The severity of the cases was defined based on the management guideline for the diagnosis and treatment of SARS-CoV-2, issued by the Brazilian Ministry of Health (Brasil, 2021a):

1) Symptoms: dyspnea/respiratory discomfort, or persistent pressure in the chest, or O2 saturation <95%, bluish color of the lips or face; 2) Time: acute respiratory condition characterized in the last 7 days for two or more signs and symptoms of fever (≥ 37.3 °C, even if mentioned), chills, sore throat, headache, cough, runny nose, olfactory or taste disorders; and 3) Evidence: laboratory test for SARS-CoV-2 (PCR-positive). Exclusion criteria were cases with absence of one or more important records for analysis, as well as patients who had a date of registration in the same system on the same day of death.

2.2. Data collection

The information collected in the MS database comes from patients treated at hospitals and health care units. Data were recorded in a registration form consisting of 80 items (Brasil, 2021a), according to the following classification: 1) demographic data: sex, age; 2) clinical and epidemiological data: i) signs of symptoms (fever, cough, sore throat, dyspnea, respiratory discomfort, O2 saturation <95%, diarrhea, vomiting); ii) comorbidities (chronic cardiovascular, liver, neurological, chronic kidney disease, asthma, Diabetes mellitus, pneumopathy, immunodeficiency, obesity; 3) care information: i) date of admission and stay in the ICU, ii) use of ventilatory support, iii) chest X-ray, iv) laboratory information: test type; v) evolution of the case: death or cure, and vi) date of discharge or death of the patient. We also used two types of classification to determine the severity of older adults admitted to the ICU, as follows: (1) Mild: for patients who had symptoms of respiratory infection (fever, cough, sore throat) and/or digestive symptoms (vomiting, diarrhea); and (2) Severe: for those who had oxygen saturation <95%, and/or symptoms of dyspnea, and/or respiratory discomfort. During the analysis, the cases were divided into two groups: died from COVID-19 and cured after virus infection. The information was collected between 10 and 20 February 2021.

2.3. Statistical analysis

The normality of the data was obtained by the Shapiro Wilk test. Numerical variables were presented by the median and interquartile range (IQR), and categorical variables by means of counts and percentages (%). The Mann-Whitney U test and ANOVA with Bonferroni post hoc was applied for the examination between numerical variables, while categorical variables were examined by the χ² or Fisher’s exact test. To examine the independent variables significantly associated (clinical and epidemiological data) with the risk of death from COVID-19 (dependent variable), a bivariate analysis was performed using the χ² test. Next, all variables that indicated p-value <0.20 were selected and included in the construction of a multivariate binary logistic regression model with a hierarchical analysis that was adjusted for age. The order of insertion of the variables was the forward stepwise modeling strategy. The results were presented by Odds ratio (OR, 95% CI). Initially, the data were organized in an Excel spreadsheet, and the statistical analysis was performed using the SPSS program, version 24.0. The level of confidence adopted was α = 5%.

3. Results

3.1. Sample characteristics

Of the 13,913 older adults registered in the MS registry, 1,544 confirmed cases of COVID-19 were analyzed. Table 1 shows the distribution of the sample characteristics, the median age was 73.5 (IQR 60 to 105 years), of these, 819 (53%) were men and 725 (47%) women. When divided into age groups, 557 were sexagenarian (36.1%), 533 septuagenarians (34.5%), 361 octogenarians (23.4%), and 93 (6.0%) aged 90 years and over. It was found that 808 (53%) died from complications caused by COVID-19, while 736 (47%) were cured after respiratory infection. Among those who died, 34.5% (n = 254) were between 60 and 69 years, and among those cured 44.9% (n = 363) were between 60 and 69 years old. Of those who died, 55.4% (n = 408) were men and 44.6% (n = 328) women, among those cured, 50.9% (n = 411) were men and 49.1% (n = 397) women. All of these data indicated a statistically significant difference.

3.2. Comorbidities and Symptoms

In this study, 47.6% of patients admitted to the ICU died (Table 1). The most common comorbidities found in all study participants were coronary heart disease (65.0%), and Diabetes mellitus (42.9%). Regarding symptoms, the most frequent were O2 saturation <95%, dyspnea (75.1%), respiratory distress (70.3%) and cough (67.2%). Proportionally, heart disease and Diabetes mellitus were more frequent.

Table 1

| Characteristic | Total (n = 1544) | Dead (n = 808) | Cured (n = 736) | p-value |
|---------------|-----------------|---------------|---------------|--------|
| Age in years (Median, IQR) | 73.5 (60-95) | 75.9 (60-95) | 71.4 (60-95) | <0.001 |
| Age categories | | | | <0.001 |
| 60-69, n (%) | 557 (36.1) | 194 (24.6) | 363 (49.1) | <0.001 |
| 70-79, n (%) | 533 (35.4) | 254 (31.9) | 279 (37.6) | <0.001 |
| 80-89, n (%) | 361 (23.4) | 225 (28.0) | 136 (18.5) | <0.001 |
| ≥90, n (%) | 93 (6.0) | 63 (7.8) | 30 (4.1) | <0.001 |
| Sex n (%) | | | | 0.996 |
| Male | 819 (53.0) | 408 (51.1) | 411 (55.2) | <0.001 |
| Female | 725 (47.0) | 399 (48.9) | 325 (44.8) | <0.001 |
| Comorbidities n (%) | | | | <0.001 |
| Heart disease | 1003 (65.0) | 475 (58.9) | 528 (65.3) | 0.740 |
| Hepatomegalia disease | 96 (6.2) | 57 (6.8) | 39 (4.8) | 0.018 |
| Hepatic Disease | 1003 (65.0) | 475 (58.9) | 528 (65.3) | 0.740 |
| Asthma | 99 (6.4) | 63 (7.8) | 36 (4.8) | 0.018 |
| Diabetes mellitus | 662 (42.9) | 312 (38.3) | 350 (47.1) | 0.320 |
| Neurological disease | 96 (6.2) | 57 (7.7) | 39 (4.8) | 0.018 |
| Pneumopathy | 147 (9.5) | 92 (11.5) | 55 (7.4) | <0.001 |
| Immunodeficiency | 58 (3.8) | 34 (4.2) | 24 (3.2) | <0.001 |
| Kidney disease | 99 (6.4) | 63 (8.6) | 36 (4.5) | <0.001 |
| Obesity | 124 (8.0) | 59 (8.0) | 65 (8.0) | 0.984 |
| Symptoms n (%) | | | | <0.001 |
| Fever | 785 (50.8) | 376 (47.1) | 409 (50.6) | 0.879 |
| Cough | 1037 (67.2) | 473 (56.4) | 564 (69.8) | 0.023 |
| Sore Throat | 233 (15.1) | 96 (12.0) | 137 (17.0) | 0.033 |
| Dyspnea | 1169 (75.7) | 608 (75.2) | 561 (71.9) | <0.001 |
| Respiratory discomfort | 1086 (70.3) | 575 (73.8) | 511 (67.3) | <0.001 |
| Diarrhea | 252 (16.3) | 118 (16.0) | 134 (16.2) | 0.783 |
| O2 saturation <95% | 1194 (77.3) | 633 (78.6) | 561 (71.9) | <0.001 |
| Vomit | 154 (10.0) | 76 (10.3) | 78 (10.3) | 0.672 |
| Severity rating | | | | <0.001 |
| Mild | 937 (60.7) | 595 (73.7) | 342 (46.5) | 0.018 |
| Severe | 1148 (73.4) | 656 (81.2) | 492 (66.9) | <0.001 |

Abbreviation: IQR, interquartile range.
* p<0.05 Mann-Whitney U test.
Table 2
Clinical and epidemiological outcomes for older patients with evidence for COVID-19, Brazil, EW 34-52.

| Characteristic              | Total (n = 1544) | Dead (n = 808) | Cured (n = 736) | p-value*                                |
|----------------------------|------------------|---------------|-----------------|-----------------------------------------|
| Heart disease              | 345(22.7%)       | 70(9.6%)      | 275(37.2%)      | 0.003                                  |
| Hematological disease      | 10(1.0%)         | 2(0.2%)       | 8(1.1%)         | 0.002                                  |
| Asthma                     | 17(1.1%)         | 3(0.4%)       | 14(1.9%)        | 0.001                                  |
| Diabetes mellitus          | 255(16.7%)       | 64(8.2%)      | 191(25.9%)      | 0.003                                  |
| Neurological disease       | 13(2.3%)         | 3(0.4%)       | 10(1.3%)        | 0.001                                  |
| Pneumopathy                | 39(2.5%)         | 8(1.0%)       | 31(4.2%)        | 0.001                                  |
| Immunodeficiency           | 27(1.8%)         | 6(0.8%)       | 21(2.8%)        | 0.001                                  |
| Kidney disease             | 28(1.8%)         | 4(0.5%)       | 24(3.2%)        | 0.004                                  |
| Obesity                    | 61(4.0%)         | 14(1.8%)      | 47(6.3%)        | 0.004                                  |
| Fever                      | 324(21.0%)       | 57(7.2%)      | 267(35.9%)      | 0.003                                  |
| Cough                      | 406(26.4%)       | 90(11.7%)     | 316(42.0%)      | 0.002                                  |
| Sore Throat                | 112(7.3%)        | 24(3.0%)      | 88(11.8%)       | 0.002                                  |
| Dyspnea                    | 451(29.5%)       | 81(10.3%)     | 370(49.9%)      | 0.003                                  |
| Respiratory discomfort     | 404(26.1%)       | 70(9.1%)      | 334(44.7%)      | 0.002                                  |
| Diarrhea                   | 101(6.5%)        | 19(2.4%)      | 82(11.0%)       | 0.003                                  |
| O2 saturation <95%         | 46(2.9%)         | 8(1.0%)       | 38(5.1%)        | 0.003                                  |
| Severity rating            | 107(6.9%)        | 20(2.6%)      | 87(11.7%)       | 0.003                                  |

Table 2 presents, in a comparative way, the comorbidities and symptoms of the evaluated population, according to age groups. The severe classification was 81.2% and 66.9% (p = 0.001) among dead and cured patients was 73.7% and 46.5% (p = 0.018), respectively.

Discussion

In this study, we present the clinical and epidemiological characteristics of 1544 Brazilians between 60 and 105 years old, infected by SARS-CoV-2 with proof of RT-PCR test, who died or were cured of the disease, admitted to the ICU between August 16 and December 26, 2020. Based on that, we analyzed variables associated with the increased risk of death for this population. The main conclusions were: (1) the most common comorbidities found were heart disease and Diabetes mellitus, however, the intergroup analysis indicated a statistical difference for kidney disease pneumopathy, while the most frequent symptoms were O2 saturation <95%, dyspnea, and respiratory discomfort; (2) in the comparison by age groups, the comorbidities Diabetes mellitus, neurological disease, and obesity stood out, and in the symptoms it was sore throat; (3) severe symptoms were found in 74.4% of the older patients, and mild symptoms were present in 60.7% of the population evaluated.

Table 3
Clinical outcomes for older patients with evidence for COVID-19, Brazil, EW 34-52.

| Characteristic              | Total (n = 1544) | Dead (n = 808) | Cured (n = 736) | p-value*                                |
|----------------------------|------------------|---------------|-----------------|-----------------------------------------|
| ICU stay/days median n (QQR) | 3 (0.81)        | 3 (0.76)      | 3 (0.81)        | 0.892                                  |
| Ventilatory support        |                 |               |                 | <0.001                                  |
| Invasive mechanical ventilation | 396 (25.6)     | 39 (4.8)      | 357 (48.5)      | 0.042                                  |
| Non-invasive mechanical ventilation | 899 (58.2)    | 575 (71.2)    | 324 (44.0)      | 0.422                                  |
| Did not use                | 249 (16.1)       | 194 (24.0)    | 55 (7.5)        | 0.422                                  |
| Chest X-ray                |                 |               |                 | <0.001                                  |
| Normal                     | 35 (2.3)         | 14 (1.7)      | 21 (2.9)        | 0.002                                  |
| Intestinal inflated        | 350 (22.7)       | 185 (22.9)    | 165 (22.4)      | 0.002                                  |
| Consolidation              | 69 (4.5)         | 38 (4.7)      | 31 (4.2)        | 0.002                                  |
| Mixed                      | 62 (4.0)         | 25 (3.1)      | 37 (5.0)        | 0.002                                  |
| Other                      | 87 (5.6)         | 41 (5.1)      | 46 (6.3)        | 0.002                                  |
| Unrealized                 | 941 (60.9)       | 505 (62.5)    | 436 (59.2)      | 0.002                                  |
| RT-PCR                     | 402 (26.0)       | 217 (26.9)    | 185 (25.1)      | 0.442                                  |
| Nasal/throat swab          | 1142 (74.0)      | 591 (73.3)    | 551 (74.9)      | 0.001                                  |

Abbreviation: ICU, intensive care unit.
Comparing the group of dead and cured, the proportion of severe cases was 81.2% and 66.9%, of mild events was 73.7% and 46.5%, respectively; (4) ten variables were presented as responsible for the increased risk of death of patients infected with SARS-CoV-2, between 60-105 years.

This retrospective analysis is the first to summarize data on the clinical characteristics of older Brazilian patients admitted to the ICU due to COVID-19, which provided evidence about the last four months of 2020. During the period analyzed, Brazil experienced the decline of the first wave of the pandemic and the rise of the second wave. Our findings brought information about individuals, who lived across 27 states of the country, which together cover 8,516,000 km² (IBGE, 2020). The results were consistent with a systematic review and meta-analysis, which showed that the higher the prevalence of comorbidities, the greater the chance of patients with COVID-19 needing intensive care (Espinosa et al., 2020), especially if the pre-existing disease is hypertension, heart disease, Diabetes mellitus (Du et al., 2020; Altunok et al., 2020), or chronic obstructive pulmonary disease (Mori et al., 2021).

Our findings pointed to heart disease and Diabetes mellitus as the most common comorbidities in the assessed population. On the other hand, the analysis of the odds ratio (OR) indicated that the comorbidities responsible for the increased risk of death were immunodeficiency (183%), kidney disease (126%), and neurological diseases (103%). The results corroborate with a representative study carried out between March and August 2020, which included 9,807 older adult Brazilians residing in a state of the federation (de Souza et al., 2020). The authors pointed out Diabetes (OR 2.33) and chronic kidney disease (OR 2.02) as factors responsible for the increased risk of death by COVID-19 among older adults.

Survival study conducted in Wuhan, China, showed that early detection and effective intervention of renal involvement is able to reduce the deaths of patients with COVID-19 (Cheng et al., 2020). There is evidence that cases confirmed laboratory by COVID-19 in which the higher the prevalence of comorbidities, the greater the chance of patients with COVID-19 needing intensive care (Espinosa et al., 2020), especially if the pre-existing disease is hypertension, heart disease, Diabetes mellitus (Du et al., 2020; Altunok et al., 2020), or chronic obstructive pulmonary disease (Mori et al., 2021).

This study had several limitations. First was its retrospective design. Second, data were collected in an electronic database that did not present patient information about radiological examinations. Therefore, this may have altered the narrative of events. In the case of COVID-19, radiological information is an important prognostic factor to obtain a quick and safe diagnosis (Lithander et al., 2020). Third, the Brazilian Ministry of Health’s online system also lacks information on laboratory data. The non-inclusion of these data in the study may have restricted the understanding of the effects of the coronavirus in older Brazilian patients. Laboratory parameters are essential because they help detect the worsening of infectious processes caused by COVID-19. These include serum ferritin, IL-6, D-dimer, C-reactive protein, serum interleukin-6, blood sodium, leukocytes, lymphocyte count, and gamma glutamyl transferase (Trecarichi et al., 2020). Therefore, the interference of these markers may have underestimated the prediction of patient death (Du et al., 2020). Fourth, the number of RT-PCR test results of older patients admitted to the ICU was irregular. For this reason, only 11% of the total older adults >60 years old present in the database were included in the study. It is considered that this number of people is not representative for the entire older Brazilian population. Fifth, our analysis did not categorize or control for the social and economic characteristics of the assessed population. This may have influenced the risk factors presented, especially in Brazil, which is a country formed by a great ethnic and cultural diversity.

5. Conclusion

In Brazil, the presence of chronic morbidities such as immunodeficiency, kidney disease, neurological disease, and pneumopathy are associated with an increased potential risk of infection and death of...
older adults due to SARS-CoV-2. The most frequent symptoms related to the risk of death in older adults were dyspnea, O2 saturation <95%, respiratory discomfort, and sore throat. The results presented can be used to improve the treatment of older Brazilian population in the fight against coronavirus, which officially numbered approximately 19 million people.

Declaration of Competing Interest
No potential conflict of interest was reported by the author.

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None

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