









COMPARATIVE ANALYSIS OF DEMOGRAPHIC CHARACTERISTICS, SYMPTOMS AND COMORBIDITIES OF ADULTS AND ELDERLY PEOPLE NOTIFIED AND CONFIRMED WITH COVID-19 IN BRAZILIAN CAPITALS

ANÁLISE COMPARATIVA DAS CARACTERÍSTICAS DEMOGRÁFICAS, SINTOMATOLOGIA E COMORBIDADES DE ADULTOS E IDOSOS NOTIFICADOS E CONFIRMADOS COM COVID-19 NAS CAPITAIS BRASILEIRAS

ANÁLISIS COMPARATIVO DE LAS CARACTERÍSTICAS DEMOGRÁFICAS, LA SINTOMATOLOGÍA Y LAS COMORBILIDADES DE LOS ADULTOS Y ANCIANOS NOTIFICADOS Y CONFIRMADOS CON COVID-19 EN LAS CAPITALES BRASILEÑAS

-  Maria Williany Silva Ventura¹
-  Mariana da Silva Diógenes¹
-  Nila Larisse Silva de Albuquerque¹
-  Glaubervania Alves Lima¹
-  Paloma Moreira de Oliveira¹
-  Ingrid Caroline Uchôa Alexandre¹
-  Lívia Maia Pascoal²
-  Francisca Elisângela Teixeira Lima¹

¹Universidade Federal do Ceará - UFC, Departamento de Enfermagem. Fortaleza, CE - Brazil.

²Universidade Federal do Maranhão - UFMA, Departamento de Enfermagem. São Luiz, Maranhão - Brazil.

Corresponding Author: Maria Williany Silva Ventura
E-mail: williany_ventura@hotmail.com

Authors' Contributions:

Conceptualization: Maria W. S. Ventura, Mariana S. Diógenes, Francisca E. T. Lima; **Data Collection:** Glaubervania A. Lima; **Investigation:** Mariana S. Diógenes, Glaubervania A. Lima, Paloma M. Oliveira; **Methodology:** Ingrid C. U. Alexandre, Lívia M. Pascoal; **Project Management:** Maria W. S. Ventura, Francisca E. T. Lima; **Statistical Analysis:** Maria W. S. Ventura, Nila L. S. Albuquerque; **Supervision:** Francisca E. T. Lima; **Visualization:** Maria W. S. Ventura, Mariana S. Diógenes, Francisca E. T. Lima; **Writing – Original Draft Preparation:** Maria W. S. Ventura, Mariana S. Diógenes, Nila L. S. Albuquerque, Glaubervania A. Lima, Paloma M. Oliveira, Ingrid C. U. Alexandre, Lívia M. Pascoal, Francisca E. T. Lima; **Writing – Review and Editing:** Maria W. S. Ventura, Mariana S. Diógenes, Francisca E. T. Lima.

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-  Luciana Regina Ferreira da Mata

ABSTRACT

Objective: to compare the demographic profile, symptoms and comorbidities of adults and elderly people notified with COVID-19 in Brazilian capitals and the *Distrito Federal* - DF. **Methods:** ecological study developed from data from the online platform e-SUS Notifica, completed until January 4, 2021, with a sample consisting of 1,416,252 individuals, using as inclusion criteria: being > 20 years old; reside in Brazilian capitals or the *Distrito Federal* - DF; and present a positive test result for COVID-19. The descriptive analysis included the exposure of absolute and relative frequencies and measures of central tendency. For the inferential analysis, Pearson's chi-square test was applied, considering a significant difference for values of $p < 0.05$. **Results:** males predominated (52%), with a mean age of 43.29 ± 14.85 years. Subjects had cough (45.4%), fever (38.8%) and other symptoms (83.1%). The most prevalent comorbidities were: heart disease (7.1%) and diabetes (4.5%). There was a significant difference ($p < 0.001$) between Brazilian regions, when comparing sex, age, being a health professional, symptoms and comorbidities. **Conclusion:** the data contributed to the knowledge about the epidemic process of COVID-19 in Brazil in the first year of the pandemic and demonstrated the distribution of cases and the relationships between demographic profile, symptoms and pre-existing diseases with the groups of Brazilian capitals.

Keywords: COVID-19; Signs and Symptoms; Epidemiology; Adult Health; Geriatrics.

RESUMO

Objetivo: comparar o perfil demográfico, a sintomatologia e as comorbidades de adultos e idosos notificados com COVID-19 nas capitais brasileiras e no Distrito Federal - DF. **Métodos:** estudo ecológico desenvolvido a partir dos dados da plataforma online e-SUS Notifica, preenchidos até dia 4 de janeiro de 2021, com amostra constituída por 1.416.252 indivíduos, utilizando como critérios de inclusão: ter idade > 20 anos; residir nas capitais brasileiras ou no Distrito Federal - DF; e apresentar resultado do teste positivo para COVID-19. A análise descritiva contou com a exposição das frequências absoluta e relativa e medidas de tendência central. Para a análise inferencial, aplicou-se o teste qui-quadrado de Pearson, considerando diferença significativa para valores de $p < 0,05$. **Resultados:** predominou sexo masculino (52%), com média de idade de $43,29 \pm 14,85$ anos. Os indivíduos apresentaram tosse (45,4%), febre (38,8%) e outros sintomas (83,1%). As comorbidades mais prevalentes foram: doenças cardíacas (7,1%) e diabetes (4,5%). Houve diferença significativa ($p < 0,001$) entre as regiões brasileiras, ao comparar sexo, idade, ser profissional da saúde, sintomas e comorbidades. **Conclusão:** os dados contribuíram para o conhecimento acerca do processo epidêmico de COVID-19 no Brasil no primeiro ano de pandemia e demonstraram a distribuição dos casos e as relações existentes entre perfil demográfico, sintomatologia e doenças preexistentes com os agrupados das capitais brasileiras.

Palavras-chave: COVID-19; Sinais e Sintomas; Epidemiologia; Saúde do Adulto; Geriatria.

RESUMEN

Objetivo: comparar el perfil demográfico, la sintomatología y las comorbilidades de los adultos y ancianos notificados con COVID-19 en las capitales brasileñas y el Distrito Federal - DF. **Métodos:** estudio ecológico, desarrollado a partir de los datos de la plataforma online e-SUS Notifica, completados hasta el 4 de enero de 2021, con una muestra compuesta por 1.416.252 individuos, utilizando como criterios de inclusión: edad > 20 años; residir en capitales brasileñas o en el Distrito Federal - DF; y presentar un resultado positivo en la prueba de COVID-19. El análisis descriptivo incluyó la presentación de frecuencias absolutas y relativas y medidas de tendencia central. Para el análisis inferencial, se aplicó la prueba de chi-cuadrado de Pearson, considerando la diferencia significativa para valores $p < 0,05$. **Resultados:** predominó el sexo masculino (52%), con una edad media de $43,29 \pm 14,85$ años. Los individuos presentaron tos (45,4%), fiebre (38,8%) y otros síntomas (83,1%). Las comorbilidades más prevalentes fueron las cardiopatías

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(7,1%) y la diabetes (4,5%). Hubo una diferencia significativa ($p < 0,001$) entre las regiones brasileñas al comparar el género, la edad, ser profesional de la salud, los síntomas y las comorbilidades. **Conclusión:** los datos contribuyeron al conocimiento del proceso epidémico del COVID-19 en Brasil, en el primer año de pandemia, y demostraron la distribución de los casos y las relaciones existentes entre el perfil demográfico, la sintomatología y las enfermedades preexistentes con los agrupados de las capitales brasileñas.

Palabras clave: COVID-19; Señales y Síntomas; Epidemiología; Salud del Adulto; Geriátrica.

INTRODUCTION

Hubei province, in particular its capital, Wuhan, was seriously affected in December 2019 by the disease known as Coronavirus Disease 2019 (COVID-19), caused by the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2)¹, classified by the World Health Organization (WHO), in March 2020, as a pandemic.²

Compared to other continents, the disease reached the Americas later, with the first case in Brazil being confirmed on February 26, 2020, in the state of São Paulo.³ On January 21, 2021, the United States was the country with the highest number of infected (24,037,236) and deaths (398,435) by COVID-19, followed by India, in total cases (10,610,883), but not in number of deaths (152,869). Brazil, on the other hand, ranked third in the ranking of confirmed cases (8,573,64) and second in terms of deaths (211,491) caused by the disease.⁴

Since its emergence, the pandemic has been the greatest public health challenge of the 21st century, causing multiple impacts on social, economic and behavioral issues, with emphasis on the collapse of health services, marked by high rates of morbidity and mortality worldwide.⁵

SARS-CoV-2 is a highly transmissible respiratory virus, even by asymptomatic infected people, which makes its spread difficult to control. The infection can cause more severe complications in individuals over 60 years of age who have preexisting health problems, proving to be more lethal in this population. However, other variants of SARS-CoV-2 emerged later and increased mortality in young adults.⁶ Although widely investigated, the behavior of this virus has not yet been fully elucidated regarding differences in susceptibility, its progression and clinical outcomes.^{5,7}

The transmission of the virus occurs mainly through respiratory droplets and direct contact with contaminated surfaces. In the early stages of the disease, symptomatic cases can be identified by the presence of fever, dry cough, muscle pain and fatigue. Among severe cases, dyspnea is

the most characteristic symptom and constitutes a strong indicator of the need for hospitalization.⁷

Given the importance of epidemiological studies to better understand the evolution of the pandemic and adopt more adequate strategies to face the disease and due to the reduced number of studies of this profile that evaluate Brazilian regions, the development of the present research is justified, in order to answer the guiding question: is there a relationship between the demographic characteristics, symptoms and comorbidities of adults and elderly people notified with COVID-19 and the regions where they live in Brazil?

Faced with this question, the objective was to compare the demographic profile, symptoms and comorbidities of adults and elderly people notified with COVID-19 in Brazilian capitals and the *Distrito Federal* (DF), with the hypothesis that there is a relationship between the variables sex, age group, occurrence of symptoms and presence of comorbidities and the grouping of capitals by Brazilian regions.

METHODS

An ecological time series study, with descriptive and analytical components based on the population, carried out from secondary data extracted from the online platform e-SUS Notifica, covering the population of individuals notified with COVID-19 in the 26 Brazilian capitals and the *Distrito Federal - DF*. The e-SUS Notifica platform was created in 2020 with the aim of receiving notifications of suspected and confirmed flu-like syndrome (FS) of COVID-19 in Brazil.⁸ This source was chosen for this study due to the scope of notifications, being the same of cases of mild FS, in order to reduce the interference of severe cases in the descriptive and inferential analysis, which may have a higher percentage of comorbidities and symptoms than expected to determine the real profile of COVID-19.

To compose the sample, the following inclusion criteria were established: age ≥ 20 years; reside in capital cities or the *Distrito Federal - DF*; and present the variable "test result" positive for COVID-19 in cases of investigation of FS. We chose to include individuals aged 20 and over because the age group prior to this cut-off point (10 to 19 years old) is classified as teenager,⁹ not being the target audience chosen to compose the study.

In addition, the choice of only the capitals and the DF is justified because they are the regions that receive a greater flow of patients with COVID-19, given the magnitude of the health network in these places. In addition,

the number of cases reported across the country and the extensive size of the database make it difficult to store and process information. Thus, after applying these criteria, the sample consisted of 1,416,252 individuals.

In data collection, we used data completed until January 4, 2021 on the e-SUS Notifica online platform, with the first case notified on February 26, 2020, extracted from the database of the Department of Informatics of the SUS (DATASUS).¹⁰ Data were selected from the investigation form of suspected cases of influenza-like illness of COVID-19 (ICD B34.2), on the website of the Ministry of Health on Notifications of Influenza Syndrome (<https://opendatasus.saude.gov.br/dataset/casos-nacionais>), using the following variables: date of birth, sex, federal unit, municipality of residence, symptoms, health professional, health conditions (pre-existing diseases) and outcome of positive test for COVID-19.

Descriptive statistical analysis was performed with data from confirmed cases of COVID-19 in the 26 capitals of the federated units and the *Distrito Federal - DF*, later grouped into the five macro-regions (North, Northeast, Midwest, South and Southeast). These data were stored and analyzed in Microsoft Excel[®] 2013 to determine the absolute and relative frequencies of the study variables, in addition to measures of central tendency of the age variable. In conducting the analysis, the normality of the distribution was not verified, because, according to the Central Limit Theorem, through independent and numerous samples (especially $N > 1,000$), the distribution of this variable naturally approaches the Gaussian distribution, that is, normal. Based on this, it is understood that verifying the normality of discrete quantitative variables, such as age, is not necessary.¹¹

Then, the variables of sex, age, symptoms and comorbidities were crossed with the variable of capitals aggregated by regions, through statistical processing in the Statistical Package for the Social Science (SPSS) software, version 22.0, applying Pearson's chi-square test in all associations, considering $p < 0.05$ as a significant difference. With this analysis, we intended to assess whether the distribution of reported cases — according to gender, age group, occurrence of symptoms and presence of comorbidities — varies between the five Brazilian regions. It should be noted that, among the data evaluated, the same patient may have reported more than one symptom, with the total number of symptoms being greater than the sum of the sample presented in the study. Likewise, the notified individuals may have reported more than one disease, and in this study, a grouped analysis of preexisting comorbidities was not performed.

The data used in this research were secondary, in the public domain, without individual identification, and approval by the Research Ethics Committee was unnecessary, according to Resolution No. 510/2016, of the National Health Council.

RESULTS

In Brazilian capitals and the *Distrito Federal (DF)*, considering the total overall, the people notified and confirmed with COVID-19 were mostly male ($N=736,217$; 52%). However, when evaluating by region, only in the capitals of the South men predominated (91.1%) and, in the other regions, the female sex presented higher percentages, with an average of 54.5%. The predominant age group was 20 to 39 years ($N= 652,324$; 46.1%), with a mean age of 43.3 ± 14.8 . A portion of individuals with COVID-19 claimed to be a health professional ($N=130,335$; 9.2%), and most of these cases were concentrated in the capitals of the Northeast ($N=45,766$; 35.1%) and Southeast. ($N=48,752$; 37.4%) (Table 1).

People reported with COVID-19 had more than one symptom, especially cough ($N=642,930$; 45.4%) and fever ($N=549,101$; 38.8%) (Table 2). Most people had symptoms different from those present on the e-SUS Notifica platform ($N=1,137,363$; 80.3%), including headache, coryza, olfactory and gustatory disorders.

Clinical symptoms related to COVID-19 showed statistically significant differences ($p < 0.001$) between regions of the country. There was a higher percentage of symptomatic adults and elderly people in the North region, in which all symptoms predominated compared to the other regions. In contrast, the South region presented the lowest percentages in all four symptoms described.

In the sum of the capitals and the DF, it was noted that the most prevalent comorbidities were heart disease ($N=84,283$; 6%), diabetes *mellitus* ($N=53,720$; 3.8%) and respiratory diseases ($N=28,893$; 2%). Among the Brazilian regions, the Southeast stood out, with the highest prevalence of heart disease ($N=31,299$; 7.1%), diabetes *mellitus* ($N=20,052$; 4.5%) and respiratory diseases ($N=10,778$; 2.4%). In terms of clinical characteristics, few people reported having autoimmune diseases ($N=4,023$; 0.3%) or obesity ($N=4,653$; 0.3%) (Table 3).

DISCUSSION

In this study, it was found that men were mainly affected by COVID-19 in Brazilian capitals; however, there was a predominance of females in four of the five

Table 1 - Characteristics of adults and elderly people with COVID-19, according to capitals and *Distrito Federal* - DF, aggregated by Brazilian regions. Brazil, 2021

	Brazilian capitals and DF	Northeast	North	Midwest	Southeast	South	p***
Variable	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	
Sex							<0.001
Male	736,217 (52.0)	152,399 (44.4)	87,317 (44.1)	103,520 (45.9)	204,964 (46.3)	188,017 (91.1)	
Female	675,897 (47.7)	189,505 (55.3)	110,623 (55.8)	122,252 (54.1)	235,155 (53.1)	18,362 (8.9)	
Undefined	4,138 (0.3)	1,016 (0.3)	247 (0.1)	59 (0)	2,755 (0,6)	61 (0)	
Age (Years)							<0.001
M* ± SD**	43.3 ± 14.8	43.9 ±14.9	42.6±14.0	42.3 ± 14.3	43.7 ± 14.9	42.9 ±15.6	
20 - 39	652,324 (46.1)	152,252 (44.4)	92,066 (46.4)	109,596 (48.5)	198,800 (44.9)	99,610 (48.3)	
40 - 59	556,692 (39.3)	137,189 (40.0)	81,229 (41.0)	87,309 (38.7)	176,660 (39.9)	74,305 (36.0)	
≥ 60	207,236 (14.6)	53,479 (15.6)	24,892 (12.6)	28,926 (12.8)	67,414 (15.2)	32,525 (15.7)	
Health Professionals							<0.001
Yes	130,335 (9.2)	45,766 (13.3)	16,247 (8.19)	14,274 (6.3)	48,752 (11.0)	5,296 (2.5)	
No	1,285,917 (90.8)	297,154 (86.7)	181,940 (91.81)	211,557 (93.7)	394,122 (89.0)	201,144 (97.5)	
Total Overall	1,416,252 (100)	342,920 (100)	198,187 (100)	225,831 (100)	442,874 (100)	206,440 (100)	

*M: Mean; **SD: Standard Deviation; ***Chi-square test

Brazilian regions, except for the South region. Faced with a real or potential situation of illness, the human being can manifest several possibilities of responses, whether biological or behavioral. With regard to biological characteristics, females have immune cells with an expression level 10 times higher than in males, in addition to having a greater quantity and activity of these cells, being less susceptible to infections.¹²

In addition, men have higher levels of cigarette and alcohol consumption and less responsible attitudes towards the pandemic, such as not using masks. These behaviors, along with biological factors, show that men are more vulnerable to COVID-19 than women.¹³

However, regarding the behavioral aspect, it is known that, in Brazil, men seek care units less, which may explain the greater number of diagnoses and case reports in women in almost all regions of the country.¹⁴ In addition, of the predominance regarding the diagnosis and notification of the disease, another survey, also carried out in Brazil, showed a higher prevalence of all the characteristic symptoms of COVID-19 in females.¹⁵

In the sample of this study, it was noticed that some affected were health professionals, who also constitute the risk group for infection by SARS-CoV-2, as they are

in direct contact with infected patients, and often their working conditions are shown to be inadequate. A study analyzed the working conditions of health professionals working during the COVID-19 pandemic and found problems such as the absence and precariousness of Personal Protective Equipment (PPE), professionals with comorbidities working on the front line and difficulties in carrying out COVID-19 tests.¹⁶

Along with demographic characteristics, symptomatology is essential to assess prognoses regarding coronavirus infection. The results shown here bring fever, cough and sore throat as the most prevalent symptoms. It is emphasized that the signs and symptoms of COVID-19 can vary between the stages of the disease, ranging from the absence of signs and symptoms, passing through mild symptomatology, and can reach the worsening of the clinical condition and even culminate in death. It is noteworthy that, despite the diversity of clinical manifestations, about 80% of infected people may remain asymptomatic.⁷

Clinical symptoms of COVID-19 were more present in people from the North region compared to the South region. A cross-sectional study carried out based on the records of tests used for the diagnosis of COVID-19 in all capitals and the *Distrito Federal* - DF observed that

Table 2 - Symptoms of adults and elderly people with COVID-19, according to capitals and *Distrito Federal* - DF, aggregated by Brazilian regions. Brazil, 2021

	Brazilian capitals and DF	Northeast	North	Midwest	Southeast	South	p***
Variable	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	
Dyspnea							<0.001
Yes	222,961 (15.7)	50,976 (14.9)	51,092 (25.8)	29,994 (13.3)	68,708 (15.5)	22,191 (10.7)	
No	1,193,291 (84.3)	291,944 (85.1)	147,095 (74.2)	195,837 (86.7)	374,166 (84.5)	184,249 (89.3)	
Sore throat							<0.001
Yes	364,001 (25.7)	92,182 (26.9)	75,157 (37.9)	58,652 (26.0)	98,404 (22.2)	39,606 (19.2)	
No	1,052,251 (74.3)	250,738 (73.1)	123,030 (62.1)	167,179 (74.0)	344,470 (77.8)	166,834 (80.8)	
Fever							<0.001
Yes	549,101 (38.8)	140,891 (41.1)	109,484 (55.2)	83,383 (36.9)	160,972 (36.3)	54,371 (26.3)	
No	867,151 (61.2)	202,029 (58.9)	88,703 (44.8)	142,448 (63.1)	281,902 (63.7)	152,069 (73.7)	
Cough							<0.001
Yes	642,930 (45.4)	163,244 (47.6)	106,356 (53.7)	99,187 (43.9)	211,087 (47.7)	63,056 (30.5)	
No	773,322 (54.6)	179,676 (52.4)	91,831 (46.3)	126,644 (56.1)	231,787 (52.3)	143,384 (69.5)	
Other symptoms							<0.001
Yes	1,137,363 (80.3)	260,927 (76.0)	152,553 (76.9)	206,568 (91.5)	364,125 (82.3)	153,190 (74.2)	
No	278,889 (19.7)	81,993 (24.0)	45,634 (23.1)	19,263 (8.5)	78,749 (17.7)	53,250 (25.8)	
No symptoms							
Yes	80,215 (5.7)	23,955 (7.0)	11,998 (6.1)	14,012 (6.2)	27,190 (6.1)	3,060 (1.5)	
No	1,336,037 (94.3)	318,965 (93.0)	186,189 (93.9)	211,819 (93.8)	415,684 (93.9)	203,380 (98.5)	
Total Overall	1,416,252 (100)	342,920 (100)	198,187 (100)	225,831 (100)	442,874 (100)	206,440 (100)	

*Chi-square test

approximately half of the reported cases underwent RT-PCR within the recommended time of three to seven days, especially the Northeast and North regions, while the South region had the lowest percentage of tests performed at the appropriate time among the five regions.¹⁷ This finding may contribute to this difference in the presence of symptoms between the North and South regions, so that the whether or not the tests are performed in a timely manner interferes with the notification of symptoms.

Data that corroborate those of the present study were also found in a survey carried out with participants of the National Household Sample Survey (PNAD-COVID19), whose spatial analysis showed that the North and Northeast regions had higher rates of cases and circular areas at greater risk. In addition, there was a higher frequency of polysymptomatic individuals, who had the symptoms

of fever, cough or sore throat, difficulty breathing or chest pain, headache, nausea or fatigue, stuffy or runny nose, eye pain and loss of smell. or flavor.¹⁸

In addition to not performing confirmatory tests for COVID-19 within the recommended interval, the population's knowledge about the disease seems to influence the total number of symptoms counted by region. In a cross-sectional survey carried out in the five geopolitical regions of the country, participants from the North and Northeast regions presented higher percentages of wrong answers to questions about the transmission of the disease, symptoms, actions to be taken in case of suspected infection and prevention. from COVID-19.¹⁹

Corroborating international findings, a survey carried out in Espírito Santo found cough, fever and headache as the most frequent symptoms of the disease. Fever and

Table 3 - Comorbidities of adults and elderly people with COVID-19, according to capital cities and the *Distrito Federal* - DF, aggregated by Brazilian regions. Brazil, 2021

	Brazilian capitals and DF	Northeast	North	Midwest	Southeast	South	p***
Variable	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	
Heart disease							<0.001
Yes	84,283 (6.0)	24,185 (7.1)	11,611 (5.9)	11,399 (5.0)	31,299 (7.1)	5,789 (2.8)	
No	1,331,969 (94.0)	318,735 (92.9)	186,576 (94.1)	214,432 (95.0)	411,575 (92.9)	200,651 (97.2)	
Diabetes							<0.001
Yes	53,720 (3.8)	15,869 (4.6)	7,496 (3.8)	7,891 (3.5)	20,052 (4.5)	2,412 (1.2)	
No	1,362,532 (96.2)	327,051 (95.4)	190,691 (96.2)	217,940 (96.5)	422,822 (95.5)	204,028 (98.8)	
Respiratory disease							<0.001
Yes	28,893 (2.0)	7,865 (2.3)	4,536 (2.3)	3,811 (1.7)	10,778 (2.4)	1,903 (0.9)	
No	1,387,359 (98.0)	335,055 (97.7)	193,651 (97.7)	222,020 (98.3)	432,096 (97.6)	204,537 (99.1)	
Immunosuppression							<0.001
Yes	8,778 (0.6)	2,164 (0.6)	1,462 (0.7)	1,382 (0.6)	3,270 (0.7)	500 (0.2)	
No	1,407,474 (99.4)	340,756 (99.4)	196,725 (99.3)	224,449 (99.4)	439,604 (99.3)	205,940 (99.8)	
Kidney disease							<0.001
Yes	5,881 (0.4)	1,693 (0.5)	906 (0.5)	868 (0.4)	2,107 (0.5)	307 (0.1)	
No	1,410,371 (99.6)	341,227 (99.5)	197,281 (99.5)	224,963 (99.6)	440,767 (99.5)	206,133 (99.9)	
Obesity							<0.001
Yes	4,653 (0.3)	963 (0.3)	615 (0.3)	829 (0.4)	2,143 (0.5)	103 (0)	
No	1,411,599 (99.7)	341,957 (99.7)	197,572 (99.7)	225,002 (99.6)	440,731 (99.5)	206,337 (100)	
Autoimmune disease							<0.001
Yes	4,023 (0.3)	1,034 (0.3)	483 (0.2)	799 (0.4)	1,271 (0.3)	436 (0.2)	
No	1,412,229 (99.7)	341,886 (99.7)	197,704 (99.8)	225,032 (99.6)	441,603 (99.7)	206,004 (99.8)	
Total Overall	1,416,252 (100)	342,920 (100)	198,187 (100)	225,831 (100)	442,874 (100)	206,440 (100)	

*Chi-square test

cough have also been observed in several other research settings, while headache is among the less common and underreported symptoms.¹⁵

A longitudinal study that aimed to describe the evolution and persistence of symptoms of COVID-19 in patients at an outpatient clinic in Geneva, Switzerland, over a period of 30 to 45 days, identified that coughing and loss of taste or smell were also common at the beginning of the disease.²⁰ The symptoms that stood out as persistent among the participants were fatigue, dyspnea and loss of taste or smell.

As new discoveries emerged regarding the diversified behavior of the disease in the human organism, symptoms such as headache, ageusia and anosmia were more present in clinical observation and in the self-report of people with the disease. This fact led to changes in the COVID-19 notification form in the e-SUS Notifica system, which led to an increase in the number of reported cases with these symptoms, which — although they already existed — were little known.

In addition to the compilation of symptoms, the present study also verified the occurrence of several

comorbidities in the reported patients. It is pointed out that the presence of diseases such as hypertension, diabetes, chronic obstructive pulmonary disease, cardiovascular and cerebrovascular disease proved to be a significant risk factor for severity in patients with COVID-19.²¹ These diseases are also observed in the Brazilian regions, according to the data demonstrated in the present study, with emphasis on the Southeast, which totals 70,920 individuals with one or more comorbidities.

The same finding was found in a study that evaluated the data of 77,075 individuals who were part of the Epi-COVID-19 Brazil study and investigated the presence of one or more chronic non-communicable diseases, according to socioeconomic and demographic characteristics, identifying the prevalence of 48% of these diseases in individuals from the Southeast region.²² Another study that also compared the presence of preexisting diseases between Brazilian regions observed that, in relation to regional differences, there was a lower prevalence of individuals with previous comorbidities in the North region,²³ which, in the present study, was the second region with the lowest number of individuals with this clinical profile.

The influence of cardiovascular diseases on the clinical course of COVID-19 is still not well understood. However, these individuals are more susceptible to developing severe forms of the disease, due to the increased incidence of cardiac and vascular symptoms — caused by the systemic inflammatory response — and the immune system disorders observed during the progression of the infection.²⁴

In diabetic patients, the disease corroborates the increase in infection by the coronavirus, since the entry of the virus into the cell is due to the binding of the viral protein to this enzyme present on the cell surface. Therefore, in addition to the virus influencing glucose metabolism, aggravating diabetes, the treatment of this comorbidity with ACE 2-stimulating drugs increases the risk of fatal outcomes in these patients when affected by COVID-19.²⁵

Through the data presented on the demographic profile and the analysis of symptoms and pre-existing diseases according to the distribution of confirmed cases among the adult and elderly public, this study has the main benefit of presenting, to the scientific community and to health agencies, an overview of COVID-19 in Brazilian capitals and the *Distrito Federal - DF*. This evidence provides subsidies for managers to monitor the behavior of COVID-19 in the country, analyzing possible changes in this scenario, in addition to structuring health services based on public policies and improving strategies to

face the pandemic in the social, economy and, above all, health.

As the study findings are extracted from secondary data, this research has limitations resulting from under-reporting and incomplete filling of the forms used as an instrument for data collection. The absence of data on some cases in the e-SUS Notifica platform is an inherent limitation of population-based databases. Although the database used in the study presents missing data, they are in a proportion of less than 5% and, given the total N analyzed, they do not compromise the internal and external validity of the study.

In addition, only the variables provided by the system itself were subject to evaluation, although the analysis of other aspects was essential to present a more robust and realistic overview of COVID-19. Another limitation to be considered is the non-specification of diagnostic tests used for notification of the case of COVID-19, considering all types of tests, with different accuracies, for inclusion of the sample in this study.

It is noteworthy that, during the pandemic, other symptoms were added to the notification form, thus generating a reduction in the percentages of some symptoms, such as headache. As for the inferential analysis, it cannot be said that the crossed data presented statistical significance due to a specific factor, since they may have been influenced by the very high value of the sample included in the study.

It is suggested the elaboration of new studies that investigate the clinical and demographic conditions of less populated Brazilian regions and areas of difficult access, as well as in regions of greater social vulnerability, contemplating individuals in penitentiary regime, in street situation or in institutions of long stay for the elderly, so that the Brazilian reality is fully understood and it is possible to make comparisons between the behavior of COVID-19 in these regions and in the capitals. This is because both are marked by territorial, social and demographic differences that influence the adoption of infection prevention measures, as well as access to health services for early identification and treatment of the disease.

CONCLUSION

This study evaluated the distribution of reported cases of COVID-19, according to sex, age group, occurrence of symptoms and presence of comorbidities, and the relationship of these variables with Brazilian capitals grouped by regions. It was found that men were the

main affected by COVID-19 in Brazil, with the exception of the predominance of females in four of the five Brazilian regions. As the main symptom among those evaluated, dyspnea was characterized as the most prevalent in all groups grouped by Brazilian regions, and the most prevalent comorbidities were heart disease and diabetes. In the inferential analysis, there were significant p values between all the data mentioned above and the groupings of capitals.

Despite the relevance of the findings, it is necessary to consider the heterogeneity of the variables analyzed between the different regions, since some of the data may be influenced by other factors, such as access to services, professional training for case investigation and notification, coverage and quality of Notifications. In addition, it is also necessary to consider the limitations in relation to underreporting of cases of COVID-19, which makes it difficult to carry out early diagnoses and delays the implementation of control measures. Consequently, there is an increase in the number of cases and deaths and a substantial increase in the difficulty of restricting the advance of the transmission of COVID-19.

In addition, the data contribute to knowledge about the epidemic process of COVID-19 in Brazil in the first year of the pandemic, as well as allowing constant analyzes that indicate the behavior of the disease in adults and the elderly.

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