Outcome of 42 thousands cases of SARS-CoV-2 in a municipality: Role of symptoms in outcome.

Géssica Fernanda Colnago de Lima[1], Ruberlei Godinho de Oliveira[2], Francisco José Dutra Souto[3], Cor Jesus Fernandes Fontes[3], Alessandra Carreira Rodrigues Gajardoni[4] and Francisco Kennedy Scofoni Faleiros de Azevedo[3]

ORIGINAL RESEARCH ARTICLE

ABSTRACT

INTRODUCTION: The coronavirus disease 2019 (COVID-19) pandemic is a major public health problem worldwide with high rates of morbidity and mortality. Elderly patients or patients with comorbidities are more likely to develop more severe conditions and consequently have a high rate of hospital lethality. The presence of some symptoms in SARS-CoV-2 infection can be associated with lower rates of mortality and admission to the ICU in patients. The aim of this study was to determine the associations between the clinical and epidemiological characteristics and clinical outcomes of SARS-CoV-2 infection patients.

METHODS: This was a retrospective cohort study of patients with COVID-19 in 2020–2021 in a municipality in the Midwest region of Brazil. The variables analyzed were age, sex, clinical characteristics, clinical results and presence of comorbidities in patients. Associations between the clinical or epidemiological characteristics were analyzed using appropriate tests for categorical variables and continuous normal or parametric distributions. An alpha value of 5% was used as the maximum error limit allowed to reject the null hypothesis in all analysis.

RESULTS: In total, 42,469 patients were analyzed, with lethality rates of 4.4% and 2.9% in 2020 and 2021, respectively. There was a higher prevalence among women (53.8%) and a higher mortality in men (p = 0.000), the elderly (p = 0.000), patients with dyspnea (p = 0.000), and patients with comorbidities (p = 0.000). The presence of headache, sore throat, anosmia, dysgeusia or diarrhea were related with a lower mortality (p = 0.000).

MAIN CONCLUSIONS: This study demonstrated higher lethality, revealing a higher mortality rate in patients who were male, aged over 65 years, with dyspnea, and with comorbidities. However, headache, sore throat, anosmia, dysgeusia, and diarrhea were associated with an improved prognosis. Further studies to elucidate these findings are warranted.

KEYWORDS:

SARS-CoV-2; anosmia; dysgeusia.

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Instituição afiliada: [1]Federal University of Mato Grosso, Faculty of Medicine, Graduate Program in Health Sciences, Cuiabá (MT), Brazil. [2]Federal University of Mato Grosso, Júlio Müller University Hospital, – Master's degree in Sciences Applied to Hospital Care, Cuiabá (MT), Brazil. [3]Federal University of Mato Grosso, Júlio Müller University Hospital, Medical Clinic Department, Cuiabá (MT), Brazil. [4]Municipal Health Department of Várzea Grande, Várzea Grande (MT), Brazil.

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Autor correspondente: *Francisco Kennedy Scofoni Faleiros de Azevedo. Email: fksfazevedo@gmail.com*

INTRODUCTION

The new coronavirus (SARS-CoV-2) appeared in December 2019 in Wuhan, Hubei, China, as a flu-like syndrome, with several cases exhibiting pulmonary involvement and rapidly progressing to severe acute respiratory syndrome (SARS). The need for mechanical ventilation (MV) and intensive care unit (ICU) for critical patients overwhelmed the health services[1].

The elderly, the immunosuppressed, and smokers, as well as patients with chronic diseases, such as obesity, heart disease, and diabetes mellitus (DM), are more susceptible to developing more severe conditions and consequently have a high rate of hospital lethality. Complications usually occur between the 7th and 12th days of the disease[2-6].

The presence of anosmia and dysgeusia is not common in other flu-like syndromes but is common in SARS-CoV-2 infection. However its impact on the COVID-19 prognosis is unknown. A retrospective cohort study demonstrated that the presence of anosmia was associated with lower rates of mortality and admission to the ICU in patients. The presence of other symptoms, such as headache, was associated with lower mortality in patients with SARS-CoV-2 infection[5-7].

Critically ill patients would benefit more from oxygen supplementation, venous thromboembolism prophylaxis, use of corticosteroids or association with immunobiologic agents[8,9].

Thus, this study aimed to describe the clinical and epidemiological characteristics and outcomes of individuals infected with SARS-CoV-2 in the municipality of Várzea Grande-MT during the first 2 years.

METHODOLOGY

Location, population, and data collection

This was a retrospective cohort study of confirmed cases of SARS-CoV-2 infection in Várzea Grande, a municipality with an area of 938.057 km^2. It is the second most populous city in the State of Mato Grosso in the Midwest region of Brazil, with 290,383 inhabitants[10]. This study was conducted with patients of both sexes, of any age,

attended on outpatient unities or hospitalized due to complications from SARS-CoV-2. The most common symptoms and signs, as well as the progression to cure or death, were recorded. The presence of comorbidities classically known as risk factors for a worse progression of COVID-19 was also recorded.

Data were collected through information provided by the epidemiological surveillance of the Municipal Health Department of Várzea Grande in patients who attended or were admitted to the Várzea Grande Municipal Hospital and emergency room, in addition to two emergency care units between April 2020 and December 2021.

The comorbidities included systemic arterial hypertension (SAH), DM, renal dysfunction, obesity, and neoplasia.

Data analysis

Data on the age, sex, presence of comorbidities, clinical characteristics, and clinical outcomes of the patients were stored in EpiDataEntry v.3.1 data file (http://www.epidata.dk/). Associations between the clinical or epidemiological characteristics were analyzed using appropriate tests for categorical variables and continuous normal or parametric distributions using EpiData Analysis v.2.2 software (http://www.epidata.dk/). Odds ratios along with the 95% confidence intervals were calculated. Stepwise regression logistic models using a backward technique were constructed including variables with $p < 0.1$ (Stata software, v.11.0, StataCorp, College Station, TX, USA) to evaluate the outcome of interest (death). When appropriate, more than one regression logistic model for the same analysis was presented, suppressing or adding variables to avoid collinearity. Pearson's goodness-of-fit test was used to evaluate the adequacy of adjustment in the multivariate models. An alpha value of 5% was used as the maximum error limit allowed to reject the null hypothesis in all analysis.

Ethical Considerations

The research protocol was evaluated and approved by the Ethical Research Board of the Júlio Muller University Hospital-Federal University of Mato Grosso (UFMT), CAAE: 53409821.0.0000.5541. As this was a retrospective study, there was a

waiver of the application of an informed consent form.

RESULTS

The first case of COVID-19 in the city was identified on March 16, 2020. By December 31, 2021, 42469 cases and 1435 deaths (3.4%) had occurred. Clinical data on the cases and their outcomes in 2020 and 2021 are presented in table 1.

Table 1. Descriptive statistics and outcomes of the patients infected with SARS-CoV-2 in the municipality of Varzea Grande-MT, Brazil, in 2020 and 2021.

Variable	Cases in 2020, n (%)	Deaths (%)	p-value	Adjusted OR (95% CI)	p-value
Total	13292 (31.3)	584 (4.4)	0.000	-	-
Sex					
Female	7150 (53.8)	234 (3.3)	0.000	-	-
Male	6142 (46.2)	350 (5.7)			
Age (years)					
<20	834 (6.3)	10 (1.2)		-	-
			0.023		
20–40	6137 (46.2)	32 (0.5)		-	-
			0.000		
41–65	4969 (37.4)	252 (5.1)		4.656	0.000
			0.000		
>65	1352 (10.2)	290 (21.4)		15.014	0.000
Pregnant					
Yes	61 (0.9)	1 (1.6)	0.401	-	-
No	7089 (99.1)	233 (3.3)			
Fever*			0.340	-	-

Yes	5611 (42.3)	239 (4.3)			
No	7650 (57.7)	337 (4.4)			
Cough*					
Yes	6538 (49.3)	288 (4.4)	0.366	0.837	0.102
No	6723 (50.7)	288 (4.3)			
Sore throat*					
Yes	4151 (31.3)	62 (1.5)	0.000	0.449	0.000
No	9110 (68.7)	514 (5.6)			
Dyspnea*					
Yes	2571 (19.4)	346 (13.5)	0.000	4.428	0.000
No	10690 (80.6)	230 (2.2)			
Diarrhea*					
Yes	2098 (15.8)	56 (2.7)	0.000	0.708	0.046
No	11163 (84.2)	520 (4.7)			
Anosmia*					
Yes	2637 (19.5)	18 (0.7)	0.000	0.460	0.010
No	10624 (80.5)	558 (5.3)			
Dysgeusia*					
Yes	2588 (19.5)	14 (0.5)	0.000	0.257	0.000
No	10673 (80.5)	562 (5.3)			
Vomiting*					
Yes	747 (5.6)	52 (7.0)	0.000	1.904	0.001
No	12514 (94.4)	524 (4.2)			
Headache*					
Yes	3691 (33.9)	49 (1.3)	0.000	0.427	0.000

Variable	Cases n (%)	Deaths (%)	p-value	Adjusted OR (95% CI)	p-value
No	7198 (66.1)	353 (4.9)			
SAH**					
Yes	1756 (13.4)	319 (18.2)	0.000	2.334	0.000
No	11343 (86.6)	233 (2.1)			
DM**					
Yes	1029 (7.9)	221 (21.5)	0.000	2.077	0.000
No	11999 (92.1)	314 (2.6)			
Renal dysfunction**					
Yes	169 (1.3)	42 (24.9)	0.000	2.229	0.001
No	12791 (98.7)	470 (3.7)			
Obesity**					
Yes	439 (3.4)	41 (9.3)	0.000	1.994	0.001
No	12591 (96.6)	494 (3.9)			
Neoplasm**					
Yes	56 (0.4)	17 (30.4)	0.000	2.275	0.027
No	12899 (99.6)	494 (3.8)			

Variable	**Cases in 2021, n (%)**	**Deaths (%)**	**p-value**	**Adjusted OR (95% CI)**	**p-value**
Total	29177 (68.7)	851 (2.9)	0.000	-	-
Sex					
Female	15695 (53.8)	391 (2.5)	0.000	1.171	0.047
Male	13482 (46.2)	460 (3.4)			
Age (years)					

<20		4 (0.1)	-	-	-
20–40	2800 (9.6)	105 (0.8)	0.000	5.788	0.001
41–65	13774 (47.2)	401 (3.9)	0.000	19.590	0.000
>65	10225 (35.0)	341 (14.3)	0.000	53.077	0.000
	2378 (8.2)				
Pregnant					
Yes	119 (0.8)	4 (3.4)	0.179	-	-
No	15576 (99.2)	287 (1.8)			
Fever*					
Yes	12636 (43.3)	413 (3.3)	0.000	1.458	0.000
No	16541(56.7)	438 (2.6)			
Cough*					
Yes	15670 (53.7)	553 (3.5)	0.000	-	-
No	13507 (46.3)	298 (2.2)			
Sore throat*					
Yes	10770 (36.9)	107 (1.0)	0.000	0.360	0.000
No	18407 (63.1)	744 (4.0)			
Dyspnea*					
Yes	3550 (12.2)	529 (14.9)	0.000	8.567	0.000
No	25627 (87.8)	322 (1.3)			
Diarrhea*			0.041	-	-

Yes	4532 (15.5)	114 (2.5)			
No	24645 (84.5)	737 (3.0)			
Anosmia*					
Yes	6934 (23.8)	88 (1.3)	0.000	0.701	0.030
No	22243 (76.2)	763 (3.4)			
Dysgeusia*					
Yes	7090 (24.3)	93 (1.3)	0.000	0.716	0.036
No	22087 (75.7)	758 (3.4)			
Vomiting*					
Yes	1840 (6.3)	58 (3.2)	0.266	-	-
No	27337 (93.7)	793 (2.9)			
Headache*					
Yes	14681 (50.3)	203 (1.4)		0.451	0.000
No	14496 (49.7)	648 (4.5)	0.000		
SAH**					
Yes	3803 (13.4)	400 (10.5)		1.890	0.000
No	24578 (86.6)	254 (1.0)	0.000		
DM**					
Yes	1448 (5.1)	207 (14.3)		1.606	0.000
No	26723 (94.9)	377 (1.4)	0.000		
Renal dysfunction**				1.800	0.038
Yes	122 (0.4)	26 (21.3)			
No	27856 (99.6)	474 (1.7)	0.000		
Obesity**				2.671	0.000

Yes	826 (2.9)	88 (10.7)	0.000		
No	27219 (97.1)	437 (1.6)			
Neoplasm**					
Yes	42 (0.2)	13 (31.0)		5.687	0.000
			0.000		
No	27927 (99.8)	487 (1.7)			

*In 2020, information on fever, cough, pain, dyspnea, diarrhea, anosmia, dysgeusia, and vomiting was provided for 13,261 patients. Information on headache was provided for 10,889 patients.

**In 2020 and 2021, information on SAH was provided by 13,099 and 28,381 patients, DM by 13,028 and 28,171 patients, renal dysfunction by 12,960 and 27,978 patients, obesity by 13,030 and 27,969 patients, and neoplasms by 12,955 and 27,969 patients, respectivelly.

DISCUSSION

We report the impact of SARS-CoV-2 infection in 2020 and 2021 in the second largest city in the State of Mato Grosso in Central-West Brazil, characterizing a very significant sample on the pandemic in the main metropolitan region of the state. The lethality rate was higher in 2020 than in 2021. This high lethality can be explained by the lack of knowledge about the disease and lack of anticipation of the health system to face an epidemic of such proportions[11].

There was a higher lethality rate in men. The reason for this is still unknown. Patients aged 65 years or older also experienced a higher lethality rate. Advanced age is the main risk factor for death in critically ill patients with SARS-CoV-2. These studies led health authorities to prioritize the initiation of vaccinations against SARS-CoV-2 in the elderly and health professionals[4,12-14].

The presence of dyspnea at the time of notification was associated with a higher rate of lethality, suggesting more severe lung involvement and a higher risk of progression to SARS[3,4,12-15].

The presence of sore throat, diarrhea, anosmia, dysgeusia, or headache was independently associated with a lower lethality rate in both 2020 and 2021. This finding is in agreement with the observations of some authors in other countries. One possibility would be respiratory failure in severe cases, causing these patients to give less importance to less relevant symptoms, when dyspnea would be the main and most distressing symptom experienced. Talavera et al. describe the presence of anosmia to be related to a lower mortality rate and lower rate of admission to the ICU, suggesting that this clinical presentation may lead to milder inflammatory response. Other studies have reported that critical patients have a lower rate of anosmia and that patients without anosmia should be monitored more closely in the early stages of SARS-CoV-2 infection due to the risk of progression to the most severe form of COVID-19. Regarding headache, other studies describe its presence as an independent predictor of a lower risk of mortality in patients hospitalized for SARS-CoV-2, in agreement with our findings[5-7,16,17].

The present series confirms the importance of comorbidities (SAH, DM, renal dysfunction, oncological diseases, or obesity) as factors of a poorer prognosis. Several studies have reported a poorer prognosis of SAR-CoV-2 infection in patients with these comorbidities[2-4,18-20].

The limitations of this study are mainly related to potential underreporting, incomplete data, non-identification of strains circulating in 2020 and 2021, in addition to a lack of the assessment of other variables and risk factors associated with mortality by SARS-CoV-2. In contrast, the large sample enabled independent associations with lethality already established in SARS-CoV-2 infection, such as comorbidities, to be made and a possible aspect of good prognosis with symptoms related to the upper airways.

CONCLUSION

This study describes SARS-CoV-2 infections with a higher lethality rate in patients aged over 65 years, those who were male, those with dyspnea, and those with comorbidities. Unexpectedly, there was lower lethality rate in patients with headache, sore throat, anosmia, dysgeusia, or diarrhea, and further studies are needed to elucidate these findings.
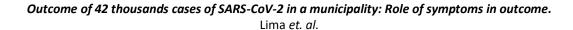
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