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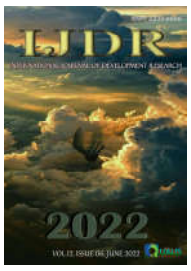

RESEARCH ARTICLE OPEN ACCESS

CLINICAL AND EPIDEMIOLOGICAL ANALYSIS OF PEOPLE AFFECTED BY COVID-19 AND ASSOCIATED FACTORS

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ABSTRACT

This quantitative descriptive and analytical study aimed to identify which sociosanitary and epidemiological factors are associated with the onset of severe COVID-19. Data from 2,702 Brazilian nationals aged 18 and over were collected online using Google® Forms from June 24 to July 1, 2020. Association between diagnosis of COVID-19 andsociosanitary and epidemiological variables was assessed. In all, 656 participants had had COVID-19. Cases were categorized into mild and severe, with 45.7% (300) of the cases classified as severe. The multivariate model showed increased odds of developing the severe form of COVID-19 in people who earned between one or two minimum wages (40%), those who reported seven symptoms or more (96%), those who had been hospitalized (78%), and those who reported oral cavity alterations (19%). Public policies are required to avoid events that may trigger the severe form of COVID-19 as severe patients are more likely to have sequelae and thus overwhelm the health system in the long term.

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INTRODUCTION

COVID-19, a disease caused by the new coronavirus, or Sars-CoV-2, is by far the biggest outbreak of atypical pneumonia since the one that occurred in 2003 with severe acute respiratory syndrome (SARS), since, in the week following its appearance, the total number of cases and deaths had already exceeded that of SARS(Peng *et al*., 2020; Wang *et al*., 2020). As of January 30, 2020, when the World Health Organization (WHO) declared the outbreak as a global emergency, measures to tackle the spread of the disease started being recommended by the emergency committee, and these measures included early detection of the disease, isolation of suspected cases, immediate treatment and implementation of a cohesive and robust system for contact tracing. In order to flatten the curve of number of cases of the disease, countries responsible for the largest economies in the world closed their borders and imposed travel restrictions and quarantine, thereby causing fear of imminent recession (Sohrabi *et al*. 2020; Nicola *et al*., 2020). Brazil, despite the enactment of law 13.979 on February 6, 2020, which provides for measures to tackle COVID-19, was severely hit by the pandemic, which got even worse at the end of February. Until mid-August 2020, there were 3,582,352 confirmed cases of COVID-19 in the country, with a 3.2% lethality rate (Brasil, 2020a; Garciaand Duarte, 2020). Because it is a recent disease, the risk factors were initially established based on similar infections, such as influenza, SARS, and MERS. Although it has been proven that young people are at a lower risk of complications, everyone is recommended to comply with government restrictions in order to protect people at a higher risk of complications due to old age or serious comorbidities (Jordan, Adab and Cheng, 2020). Importantly, advanced age, cardiovascular diseases, diabetes, chronic

respiratory diseases, hypertension, and cancer increase the risk of death from COVID-19 (Wuand Mcgoogan, 2020). However, younger people are also at risk of dying from COVID-19, although that risk is five times lower compared with that of older adults (Jordan, Adaband Cheng, 2020). The first clinical sign that allowed the detection of the disease was pneumonia. Signs and symptoms of this virus infection include fever, unproductive cough, dyspnea, myalgia, fatigue, normal or decreased white blood cell count and radiographic evidence of pneumonia. Subsequent reports also described gastrointestinal symptoms and asymptomatic infections, especially in young children. In more severe cases, organic dysfunctions such as anaphylactic shock, SARS, cardiac injury, acute kidney injury, and even death may occur (Velavanand Meyer, 2020; Huang *et al*., 2020). For a better management of COVID-19 patients in the public health system, Brazil's Ministry of Health (MoH) recommended the stratification of cases of flu-like syndrome by defining the differences between mild and severe cases of this disease so that they could be referred according to severity. Mild cases are now treated at a Primary Health Care (PHC) level through the Family Health Strategy and severe cases must be immediately referred to Reference/Specialized Care Centers (Brasil, 2020b). In this context, this study aimed to identify which social, sanitary and epidemiological factors in the Brazilian population affected by Covid-19 are related to the progression to the severe form of the disease.

MATERIALS AND METHODS

This quantitative descriptive and analytical study analyzed data collected through an online questionnairebuilt on Google® Formsand delivered through WhatsApp and Instagram from June 24 to July 1, 2020. The author-developed data collection instrument was administered toBrazilians aged 18 and over who completed the questionnaire on COVID-19. Before final data collection, the questionnaire was sent to ten respondents for piloting and adjustment. The questionnaire comprised both open-ended and multiple-choice questions on the following:

- Sociodemographic conditions (age, gender, marital status, place of residence, education, household income, employment status, and number of people living in the same house);
- Harmful habits (smoking and drinking);
- Clinical evolution of COVID-19 (self-reported symptoms, oral changes caused by the Sars-CoV-2, hospitalization, sequelae, history of COVID-19 cases in the family, and history of COVID-19-related deaths in the family).

Sample was calculated considering the estimated number of inhabitants in Brazil in the year 2020 (n=211,755,692), which was obtained from publicly accessible documents on the website of the Brazilian Institute of Geography and Statistics (IBGE, 2020). A sample size calculator (https://www.surveysystem.com/sscalc.htm) was used considering the minimum sample size to estimate a population proportion with a maximum expected proportion of 20%, a significance level of 5% (95% confidence interval) and maximum permissible error of 4%. A minimum sample of 601 people was estimated, but a total of 2,702 respondents were obtained. The participants who reported a diagnosis of COVID-19 were classified into two groups: mild cases and severe cases. This classification was based on the stratification of cases of flu-like syndrome defined in the guidelines for diagnosis and treatment of COVID-19 issued by Brazil's Ministry of Health. Mild cases were those without any symptoms, or without severe symptoms, who did not present any clinical risk factor. Severe cases were those with severe signs and symptoms or those who exhibited clinical risk factors. This group included participants with non-communicable diseases, high-risk pregnant women, obese individuals, among others. Symptoms of severity in adults are those that compromise the respiratory and cardiovascular systems or any warning signs and symptoms such as worsening clinical conditions of underlying diseases, persistent or increasing fever for more than three days, recurrence of fever after forty eight hours, and change in mental status (Brasil, 2020b). In the present study, mild cases were those who reported having had asymptomatic COVID-19 or who presented with fever, myalgia, cough, loss of smell or taste, loss of appetite, sore throat, headache, nasal congestion, diarrhea, conjunctivitis, hair loss and skin rashes or changes in the color of the fingers or toes and did not have chronic diseases were considered mild cases. Respondents with a diagnosis of COVID-19 who allegedly experienced shortness of breath or had chronic diseases were considered severe cases. After defining the criteria for classifying cases into mild and severe, we conducted an inferential analysis of the severity of COVID-19 and its association with sociodemographic factors, hospitalization, and oral changes resulting from the disease. The data were analyzed using IBM® Statistical Package for the Social Sciences – SPSS® version 24.0. Absolute and relative frequencies of all study variables were calculated, and associations between variables were checked using the Chi-squared test and prevalence ratio estimation with a 95% confidence interval and 5% significance level. The study complied with the ethical principles described in Resolutions CNS/MS 466/12 and 510/1619[20] and was approved by a research ethics committee (Approval No. 4.074.087).

RESULTS

The study was conducted with data from 656 of the 2702 people who participated in the Brazilian study titled "From the new SARS-CoV-2 to the COVID-19 pandemic: The burden of disease and the deployment of Public Health measures in Brazil". Table 1 shows that 9.6% (63) of the participants had some relative who died from COVID-19.

Table 1. Descriptive analysis and sociodemographic characteristics of the population affected by COVID-19. Brazil, 2020

Variables	N	%
Age		
Up to 59 years	627	95.6
60 and older	29	4.4
Gender		
Women	481	73.3
Men	175	26.7
Education		
Complete or incomplete primary education	7	1.1
Complete or incomplete secondary education	63	9.6
Complete or incomplete undergraduate education	225	34.3
Complete or incomplete graduate education	361	55.0
Marital status		
Married/Common-law marriage	400	61.0
Single/ Divorced/Widowed	256	39.0
Number of people living in the house?		
More than five	42	6.4
3-5	434	66.2
2	156	23.8
Living alone	24	3.7
Employment status		
Retired/Pensioner	33	5.0
Self-employed	187	28.5
Unemployed	72	11.0
Formally employed	199	30.3
Civil servant	165	25.2
Household income		
Less than 1 minimum wage	19	2.9
1-2 minimum wages	114	17.4
2-5 minimum wages	180	27.4
More than 5 minimum wages	343	52.3
Somking		
Yes	24	3.7
No	632	96.3
Alcohol abuse		
Yes	35	5.3
No	621	94.7

Source: author's own construction.

Of the respondents diagnosed with COVID-19, 95.6% (627) were aged 18-59 years, 73.3% (481) were women, 55% (361) had either completed or were undertaking graduate degrees, 61% (400) were

either married or lived in a common-law marriage, 66.2% (434) reported living with 3-5 people in the same house, 30.3% (199) had a formal job, 28.5% (187) were self-employed, and 25.2% (165) were public servants. Most of the participants had an income above 5 minimum wages [52.3% (343)], followed by 2 and 5 minimum wages [27.4% (180)]. Regarding harmful habits, 3.7% (24) of the participants reported smoking, and 5.3% (35) reported binge drinking. (Table 1). Table 2 shows that 45.7% (300) of the respondents were classified as severe cases according to the Brazilian guidelines on the diagnosis and treatment of COVID-19, and 49.7% (149) of them reported shortness of breath even though they did not have any chronic disease.The remaining 54.3% (356) were classified as mild cases, with only 3.4% (22) of the respondents being asymptomatic. A total of 73.6% (483) of all the participants developed symptoms, and 21.3% of these had some chronic disease.

Table 2. Severe and mild cases of COVID-19 and development of symptoms related to chronic diseases and shortness of breath.

Variables	N	%
Severity (n=656)		
Severe	300	45.7
Mild	356	54.3
Reason for being severe (n=300)		
Shortness of breath	149	49.7
Chronic disease	88	29.3
Chronic disease and shortness of breath	63	21
Shortness of breath/Chronic disease (n=656)		
No shortness of breath or chronic disease	356	54.3
Chronic disease	88	13.4
Chronic disease and shortness of breath	63	9.6
Shortness of breath	149	22.7
Symptom (any)/Chronic disease (n=656)		
No symptom or chronic disease	22	3.4
Chronic disease	11	1.7
Symptomatic (any symptom)	483	73.6
Symptomatic and chronic disease	140	21.3

Table 3 shows that statistical significance was found only for household income. with people who earned 1-2 minimum wages being 1.42 times more likely to develop the severe form of COVID-19 (p=0.012). Table 4 shows the association of mild and severe COVID-19 with symptoms. sequelae. need for hospitalization. and oral changes. Severe COVID-19 were associated with shortness of breath (p<0.001). diarrhea (p=0.002). headache (p=0.016). loss of appetite (p<0.001). myalgia (p<0.001). fever (p<0.001). cough (p<0.001). number of symptoms (p<0.001). sequelae (p<0.001). hospitalization (p<0.001). and oral changes (p<0.001).The chances of developing severe COVID-19 were higher among people who reported shortness of breath (PR=5.05). presented seven or more symptoms (PR=1.94). and had been hospitalized (PR=2.08). Although shortness of breath was reported by all the patients who had developed the severe form of the disease [100% (212)]. 19.8% (88) of the respondents classified as severe cases reported having pre-existing chronic diseases. but with no respiratory impairment. The participants with severe COVID-19 reported other important symptoms. including rashes [57.4% (31)] and hair loss [53.4% (55)]. Mild cases were characterized by conjunctivitis [51.6% (16)]. nasal congestion [51.4% (149)]. headache [51% (226)]. sore throat [52.2% (151)]. myalgia [50.5% (244)]. and loss of smell [52.6% (215)]. Moreover. 73.6% (39) of the participants who reported one or two symptoms were classified as mild cases.

Of the people who were cured. 59% (278) said they had developed the mild form of the disease. and 66% (66) of those who were left with sequelae developed the severe form of COVID-19. The main sequelae reported were non-recovery of full respiratory. gustatory. or olfactory capacities. Of the people who needed hospitalization. 90.3% (28) had experienced the severe form of the disease. and 58.7% (81) of the people with severe COVID-19 presented oral changes caused by the disease. Table 5 shows the multivariate model for the analysis of the main study variables. Respondents who were either married or lived in a common-law marriage exhibited a 23% higher rate of severe COVID-19 compared with single. divorced or widowed participants. Those with a household income of 1-2 minimum wages had a 40% higher prevalence of severe COVID-19 compared with those with an income of more than 5 minimum wages. People who developed 7 symptoms or more exhibited a 96% higher prevalence rate of severe COVID-19 compared with those who had up to 2 symptoms. The participants who had COVID-19 and required hospitalization presented a 78% higher prevalence of the severe form of the disease compared with those who did not need hospitalization. Finally. those who exhibited oral changes presented a 19% higher prevalence of severe COVID-19 compared with those who did not develop oral problems.

DISCUSSION

Before hitting Brazil, COVID-19 was already a threat to the country as it faced some challenges such as the high risk of crossinfection in densely populated areas and the low access to health services in places where the number of beds in intensive care units (ICUs) is scarce and poorly distributed, especially in states with a low population density (Palaminand Marson, 2020). On October 3. 2020. Brazil ranked third in number of cases worldwide. with 4.906.833 confirmed cases. and the United States of America were the country with the highest number of confirmed cases – 7.332.285 (Brasil, 2020c). The study by Iser *et al*. (2020) showed that circa 80% of infected people can be asymptomatic. This finding is important because in our study only 3.4% of cases were asymptomatic and tested positive for COVID-19. Peng *et al*. (2020) emphasized that the virus can be transmitted from person to person by direct or indirect contact through thick or small droplets and saliva, and contamination can even occur through contact with asymptomatic patients. The same has been highlighted by Rivett *et al*. (2020) who found that asymptomatic or pre-symptomatic transmission accounted for nearly half of the cases of COVID-19. In this context. there are probably many cases left undiagnosed. which might lead to a more intense transmission of the virus. Therefore. Kim *et al* (2019) suggest that social distancing be effectively implemented in order to prevent disease transmission from asymptomatic individuals or people with mild and unnoticed symptoms.

Therefore, Rivett *et al* (2020) state that much broader testing programs are required to identify people when they are most infectious so as to reduce the transmissibility potential of the Sars-CoV-2 virus. This is because asymptomatic cases are not being notified, but theyare highly contagious. In addition to the rapid and wide transmission by people who do not develop symptoms. COVID-19 can be transmitted during family gatherings and its morbidity and mortality rate are higher than those of SARS (Zhou *et al*., 2020). This was observed in our study. in which 61.9% of the respondents who lived with more than five people developed the severe form of the disease. The research data indicate 45.7% of the cases were severe and 54.3% were mild. which differ from the findings of the study by Noronha *et al*. (2020). in which 80% of the patients affected by COVID-19 did not have complications and developed only mild symptoms. with only 15% progressing to a more severe form of the disease and needing referral to hospital for oxygen therapy and the other 5% needing intensive care. Different findings were also reported by Meng, Hua and Bian (2020). who found 15% to 25% of severe cases among all the patients with COVID-19 in China. However. our findings agree with the findings of the afore mentioned studies as most of the patients with COVID-19 had developed only the mild form of the disease.

The small difference between mild and severe cases in our study may be explained. according to Reis *et al*. (2020). by the high rate of underreporting and the poor compliance with social distancing measures in Brazil. which could only reduce contact by circa 40%. COVID-19 can be asymptomatic. mild. and severe. and it can lead to death. Common symptoms include cough. fever. and shortness of breath. Other reported symptoms are weakness. malaise. difficulty breathing. muscle pain. sore throat. and loss of taste and/or smell (Esakandari *et al*., 2020).

Table 3. Association between severity of COVID-19 and sociodemographic variables. Brazil. 2020

Variables	Total	Severe COVID-19		Mild COVID-19		PR (95%CI)	p value
		N	%	N	%		
Age							0.778
Up to 59 years	627	286	45.6	341	54.4	1	
60 and older	29	14	48.3	15	51.7	1.06 (0.72 - 1.56)	
Gender							0.599
Women	481	217	45.1	264	54.9	1	
Men	175	83	47.4	92	52.6	1.05 (0.87 - 1.26)	
Education							0.396
Complete or incomplete primary education	7	3	42.9	4	57.1	0.99 (0.42 - 2.35)	
Complete or incomplete secondary education	63	34	54.0	29	46.0	1.25 (0.97 - 1.61)	
Complete or incomplete undergraduate education	225	107	47.6	118	52.4	1.1 (0.92 - 1.32)	
Complete or incomplete graduate education	361	156	43.2	205	56.8	1	
Marital status							0.195
Married/Common-law marriage	400	191	47.8	209	52.3	1.12 (0.94 - 1.34)	
Single/ Divorced/Widowed	256	109	42.6	147	57.4	1	
Number of people living in the house?							0.333
More than five	42	16	38.1	26	61.9	1.02 (0.53 - 1.94)	
3-5	434	209	48.2	225	51.8	1.28 (0.76 - 2.17)	
2	156	66	42.3	90	57.7	1.13 (0.65 - 1.95)	
Living alone	24	9	37.5	15	62.5	1	
Employment status							0.428
Retired/Pensioner	33	13	39.4	20	60.6	1	
Self-employed	187	82	43.9	105	56.1	1.11 (0.71 - 1.75)	
Unemployed	72	36	50.0	36	50.0	1.27 (0.78 - 2.06)	
Formally employed	199	85	42.7	114	57.3	1.08 (0.69 - 1.71)	
Civil servant	165	84	50.9	81	49.1	1.29 (0.82 - 2.02)	
Household income							0.012
Less than 1 minimum wage	19	8	42.1	11	57.9	1	
1-2 minimum wages	114	68	59.6	46	40.4	1.42 (0.82 - 2.45)	
2-5 minimum wages	180	75	41.7	105	58.3	0.99 (0.57 - 1.72)	
More than 5 minimum wages	343	149	43.4	194	56.6	1.03 (0.6 - 1.77)	
Smoking							0.669
Yes	24	12	50.0	12	50.0	1.1 (0.73 - 1.65)	
No	632	288	45.6	344	54.4	1	
Alcohol abuse							0.484
Yes	35	14	40.0	21	60.0	1	
No	621	286	46.1	335	53.9	1.15 (0.76 - 1.74)	

Source: authors' own construction. Chi-squared test

Table 4. Association of severity of COVID-19 with symptoms, sequelae, hospitalization, and oral changes.

Variables	Total	Severe COVID-19		Mild COVID-19		PR (95%CI)	p value
		N	%	n	%		
Shortness of breath							<0.001
Yes	212	212	100.0	0	0.0	5.05 (4.18 - 6.08)	
No	444	88	19.8	356	80.2	1	
Rash							0.072
Yes	54	31	57.4	23	42.6	1.28 (1 - 1.64)	
No	602	269	44.7	333	55.3	1	
Conjuntivitis							0.761
Yes	31	15	48.4	16	51.6	1.06 (0.73 - 1.54)	
No	625	285	45.6	340	54.4	1	
Hair loss							0.089
Yes	103	55	53.4	48	46.6	1.21 (0.98 - 1.48)	
No	553	245	44.3	308	55.7	1	
Nasal congestion							0.186
Yes	290	141	48.6	149	51.4	1.12 (0.95 - 1.32)	
No	366	159	43.4	207	56.6	1	
Diarrhea							0.002
Yes	268	142	53.0	126	47.0	1.3 (1.1 - 1.53)	
No	388	158	40.7	230	59.3	1	
Headache							0.016
Yes	443	217	49.0	226	51.0	1.26 (1.04 - 1.52)	
No	213	83	39.0	130	61.0	1	
Sore throat							0.357
Yes	289	138	47.8	151	52.2	1.08 (0.92 - 1.28)	
No	367	162	44.1	205	55.9	1	
Loss of appetite							<0.001
Yes	267	144	53.9	123	46.1	1.34 (1.14 - 1.59)	
No	389	156	40.1	233	59.9	1	
Myalgia							0.001
Yes	483	239	49.5	244	50.5	1.4 (1.12 - 1.75)	
No	173	61	35.3	112	64.7	1	
Loss of smell							0.260
Yes	409	194	47.4	215	52.6	1.11 (0.93 - 1.32)	
No	247	106	42.9	141	57.1	1	
Fever							<0.001

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Yes	341	184	54.0	157	46.0	1.47 (1.23 - 1.75)	
No	315	116	36.8	199	63.2	1	
Cough							<0.001
Yes	346	191	55.2	155	44.8	1.57 (1.31 - 1.88)	
No	310	109	35.2	201	64.8	1	
Number of symptoms							<0.001
7 or more	233	151	64.8	82	35.2	1.94 (1.19 - 3.18)	
5-6	203	88	43.3	115	56.7	1.3 (0.78 - 2.16)	
3-4	134	36	26.9	98	73.1	0.81 (0.46 - 1.41)	
1-2	53	14	26.4	39	73.6	0.79 (0.41 - 1.53)	
None	33	11	33.3	22	66.7	1	
Completely cured							<0.001
Yes	471	193	41.0	278	59.0	1	
Recovering	85	41	48.2	44	51.8	1.18 (0.92 - 1.5)	
Sequelae	100	66	66.0	34	34.0	1.61 (1.35 - 1.92)	
Family history of COVID-19?							0.896
Yes	497	228	45.9	269	54.1	1.01 (0.83 - 1.23)	
No	159	72	45.3	87	54.7	1	
Family history of COVID-19-related death?							0.829
Yes	63	28	44.4	35	55.6	0.97 (0.73 - 1.29)	
No	593	272	45.9	321	54.1	1	
Hospitalization							<0.001
Yes	31	28	90.3	3	9.7	2.08 (1.79 - 2.4)	
No	625	272	43.5	353	56.5	1	
Oral changes							<0.001
Yes	138	81	58.7	57	41.3	1.39 (1.17 - 1.65)	
No	518	219	42.3	299	57.7	1	

Table 5. Multivariate model for COVID-19 in people who developed the severe form of the disease

Variables	PR	95%CI	p value
Marital status			
Married/Common-law marriage	1.23	1.04 - 1.46	0.019
Single/Divorced/Widowed	1		
Household income			
Less than 1 minimum wage	0.955	0.58 - 1.57	0.857
1-2 minimum wages	1.396	1.15 - 1.69	0.001
2-5 minimum wages	0.95	0.78 - 1.16	0.613
More than 5 minimum wages	1		
Number of symptoms			
7 or more	1.959	1.38 - 2.78	<0.001
5-6	1.428	0.99 - 2.05	0.055
3-4	0.869	0.57 - 1.33	0.520
Up to 2	1		
Hospitalization			
Yes	1.782	1.51 - 2.1	<0.001
No	1		
Oral changes			
Yes	1.185	1.01 - 1.39	0.041
No	1		

Paying attention to how the disease progresses and the amount of symptoms is very important considering that the findings showed that people who developed 7 symptoms or more had a 96% higher prevalence of severe COVID-19 compared with those who had up to 2 symptoms. More than half of the respondents affected by COVID-19 had fever (52%) and cough (52.7%). Meng, Hua and Bian (2020) also found fever and dry cough in most of their study participants. According to Zhou *et al*. (2020). these are the most common COVID-19 symptoms. but in our study the most reported symptoms were myalgia (74%) and headache (67.5%). The rate of people who reported headache was different from that of the study by Huang *et al*. (2020). in which only 8% of the people with COVID-19 had reported this symptom. Other symptoms such as shortness of breath. fatigue. muscle pain. confusion. headache. sore throat. diarrhea and vomiting were also reported by Zhou *et al*. (2020). and many of these symptoms were also found in our study – 52.2% of the study participants who had mild COVID-19 reported experiencing sore throat. 50.5% reported myalgia. and 47% reported diarrhea. According to Lima *et al*. (2020). there seems to be a male predilection for Sars-CoV-2. as more men are affected by COVID-19 than women. Bwire (2020) also highlighted this gender difference by stating that men are more likely to die from COVID-19 than women. A male predilection for severe disease was also observed in our study. In all. 47.4% of men developed the severe form of the disease against 45.1% of women.

Lima *et al*. (2020) explain that the lower rate of COVID-19 among women may be due to the important role of women's X chromosomes and their sex hormones. as they play an important role in the body's immune system. On the other hand, Bwire (2020) explains that women generally have a healthier lifestyle, with lower rates of smoking and drinking found among them. In addition, they have a more responsible attitude towards the COVID-19 pandemic than men. Household income highlighted how much socioeconomic inequalities interfere with people's health. as those who earned 1 or 2 minimum wages had a 69% higher prevalence of severe COVID-19 compared with those with a household income of more than five minimum wages. To reduce the risk of vulnerable groups. Rozenfeld *et al* (2020) suggested strategies such as promoting appropriate prevention education. access to health care. including routine care and COVID-19 tests. and efforts to dealing with hazardous housing and working conditions. Some risk factors for hospitalization due to COVID-19 highlighted by Bastos *et al*. (2020) include age over 60 years and presence of chronic diseases such as diabetes. hypertension. respiratory diseases. and heart diseases. Cases that require hospitalization are more worrying as hospitalized people had a 78% higher prevalence of severe COVID-19 compared with those who did not need hospital services. The same was found in the study by Casas-Rojo *et al*. (2020). in which most of the patients hospitalized with COVID-19 in Spain had a severe form of the disease as one in three patients developed breathing difficulties and one in five died. In the

present study. the respondents who reported oral changes had a 19% higher prevalence of severe COVID-19. Oral cavity alterations in patients with Sars-CoV-2 were also reported by Santos *et al*. (2020). The researchers found that acute COVID-19 infection and the therapeutic measures taken to tackle it can potentially contribute to adverse outcomes related to oral health and increase the chances of several opportunistic fungal infections, recurrent infection of the oral herpes simplex virus (HSV-1), ulcerations, dysgeusia, xerostomia, gingivitis,and other problems. Therefore, it is important to assess possible oral changes in patients with COVID-19 as they are more likely to trigger a more critical form of the disease. As a limitation of the present study, the sampling bias should be highlighted, since the questionnaire was distributed to contacts of the researchers who advertised the questionnaire on their social media, thereby influencing the sociodemographic profile of the study population.

CONCLUSION

Of the 656 respondents who had COVID-19. 45.7% (300) progressed to a severe form of the disease. The onset of the severe form of the disease was associated with factors such as being married/living in a common-law marriage. lower levels of household income. having seven or more symptoms. and presenting oral alterations due to COVID-19. Few asymptomatic COVID-19 cases were identified in the study (3.4%). Public policies should focus more on the disease and on those individuals who are more likely to progress to a severe form as they are more likely to need hospital support and experience sequelae that can overwhelm the health system in the long term.

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