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ORIGINAL ARTICLE

Epidemiological Characteristics of SARS-CoV-2 in Elderly Mexican Population: A Perspective of Mortality

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Abstract

Background: COVID-19 caused by the SARS-CoV-2 virus emerged in China at the end of December 2019, affecting the world population. Elderly people are considered a risk population for complications and mortality by SARS-CoV-2.

Methods: We analyzed the open data of COVID-19 from the Mexican government from March 19th to June 19th, 2020. A total of 141,009 cases were included, of which 7,394 were patients over the age of 65 and had a positive RT-PCR test for SARS-CoV-2. We investigated symptoms, comorbidities, pneumonia diagnosis, the need for hospitalization, orotracheal intubation, and intensive care unit [ICU] admission. The data was analyzed with SPSS version 25.0 for Windows.

Results: In a population over the age of 65 years, 57% (n = 3,899) were men; 59.7% (n = 4,413) required hospitalization; and 50.4% (n = 3,724) had a diagnosis of pneumonia. The most frequent comorbidity was hypertension with 46.4% (n = 3,433), followed by diabetes with 34% (n = 2,514). The main symptoms were cough (78.8%), fever (73.8%), dyspnea (58.7%), and headache (65.1%). 8.9% (n = 661) required mechanical ventilation and 5.3% (n = 394) were admitted to the ICU. The mortality was of 39.5% (n = 2,917).

Conclusions: Comorbidities are frequent in older adults and mortality is high. In this population, a small proportion of patients were intubated and admitted to the ICU.

Keywords

SARS-CoV-2, COVID-19, Coronavirus, Elderly population, Mortality

Introduction

In late 2019, a group of patients with pneumonia of unknown origin were linked to a seafood market in Wuhan, China. On December 31st, the Chinese Center for Disease Control and Prevention (CDC of China) sent a rapid-response team to accompany health authorities in Hubei Province and Wuhan City to investigate these cases [1].

In January 2020, a new coronavirus was identified as the causal agent for these patients [2,3]. Subsequently, the virus was named by the World Health Organization (WHO) as the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), and the disease caused by it became known as Coronavirus 2019 (COVID-19) [4,5].

The disease affected various provinces of China and other countries in the world and consequently, it was declared as a pandemic by WHO. The spread of the virus has been such that it has caused a significant economic and healthcare burden on health systems all around the world [6].

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Since the first reports of patients with this disease, advanced age was proposed as a risk factor for progressing to severe disease and a 'darker' prognosis [7,8]. The proportion of elderly patients admitted to a hospital varies according to the studied region. A study in Wuhan, China found that from all patients infected with COVID-19, 18.6% were elderly people [9] (the proportion of other studies carried out in China ranges from 11-37% [10,11]). This contrasts with studies carried out in other regions of the world. For example, a study carried out in Spain reported that 57.9% of patients hospitalized for COVID-19 were over 65-years-old [12], figures similar to a study carried out in Lombardy Italy, which reported that 60% of patients who were admitted to the hospital were over the age of 60 [13].

On another note, multiple studies have shown that patients over the age of 65 who require mechanical ventilation are more likely to die compared to younger patients [14]. The CDC has reported that 8 out of 10 deaths caused by COVID-19 are from people of the above age group [15].

In addition to age, other factors have been implicated as predictors of poor prognosis. At least five studies have reported that male patients have a worse prognosis. Specific comorbidities have also been associated with worse outcomes in these patients, such as diabetes, hypertension, obesity, and coronary heart disease [16].

In Mexico, there is scarce information in this regard. Therefore, the objective of this study is to describe the epidemiological characteristics of patients over the age of 60 with a diagnosis of SARS-CoV-2 in Mexico City.

Methods

An observational, descriptive, transversal for longitudinal and retrospective study was developed. We used the open data from the government of Mexico City (https://datos.cdmx.gob.mx/pages/covid19/) from March 19th to June 19th, 2020. We selected patients over 65 years of age with a positive RT-PCR for SARS-CoV-2. A total of 7,394 patients were included in this study (Figure 1).

We included demographic data such as age, sex, comorbidities, symptoms presented at the moment of the epidemiological studies, hospitalization requirement, mechanical ventilation, intensive care unit [ICU] admission, and the outcome 'survived' or 'did not survive' for any cause.

Statistical analysis

The data distribution was determined with Kolmogorov-Smirnov. The categorical and continuous data are shown with percentages, and median and standard deviation [SD], respectively. A comparison of groups ('did not survive' and 'survived') was conducted. T-student test was used to compare means and chi-square to find association in categorical data. The data was analyzed with the statistical package SPSS version 25.0.

Results

A total of 141,009 patients were diagnosed with COVID-19. 7,394 patients aged over 65 years were included, of which 57% (n = 4,216) were men. The mean age of the sample was 73.35 ± 7.02 years old (Table 1).

The most frequent comorbidities were hypertension (46.4%, n = 3,433), diabetes (34%, n = 2,514), and obesity (17.9%, n = 1,323). Statistical differences existed with diabetes (p = < 0.001), Chronic Obstructive Pulmonary Disease (COPD) (p = < 0.001), hypertension (p = < 0.001),

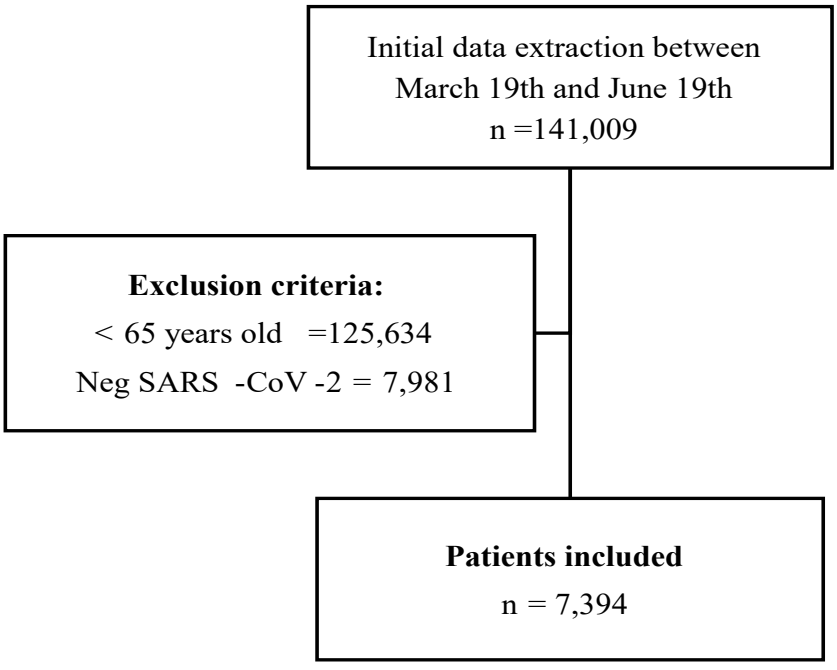

Figure 1: Database data.

Table 1: Group comparison of population characteristics based on mortality.

	Total	Did Not Survive	Survived	P- value
Sex				
Men	4216 (57.0)	1877 (64.3)	2339 (52.2)	< 0.001
Age	73.35 ± 7.02	74.0 ± 6.94	72.8 ± 7.0	< 0.001
Comorbidities				
Diabetes	2514 (34.0)	1115 (38.5)	1399 (31.4)	< 0.001
COPD	466 (6.3)	216 (7.5)	250 (5.6)	< 0.001
Asthma	109 (1.5)	30 (1.0)	79 (1.8)	0.011
Immunosuppressive therapy	216 (2.9)	92 (3.2)	124 (2.8)	0.448
Hypertension	3433 (46.4)	1427 (49.3)	2006 (45.0)	< 0.001
HIV	35 (0.5)	11 (0.4)	24 (0.5)	0.334
Other conditions	294 (4.0)	132 (4.6)	162 (3.6)	0.049
Cardiac disease	544 (7.4)	231 (8.0)	313 (7.0)	0.125
Obesity	1323 (17.9)	550 (19.0)	773 (17.4)	0.069
Chronic kidney disease	344 (4.7)	191 (6.6)	153 (3.4)	< 0.001
Smoking	773 (10.5)	337 (11.6)	436 (9.8)	0.011
Viral exposure	1744 (23.6)	256 (26.2)	1488 (48.4)	< 0.001
Exposure to birds	134 (1.8)	40 (1.4)	94 (2.1)	0.025
Exposure to pigs	38 (0.5)	6 (0.2)	32 (0.7)	0.003

Table 2: Group comparison of symptoms based on mortality.

Symptoms	Total	Did Not Survive	Survived	P-value
Fever	5451 (73.7)	2388 (81.9)	3063 (68.5)	< 0.001
Cough	5822 (78.7)	2432 (83.5)	3389 (75.7)	< 0.001
Odynophagia	2898 (39.2)	1171 (41.1)	1727 (39.3)	0.138
Dyspnea	4340 (58.7)	2284 (78.3)	2056 (46.0)	< 0.001
Irritability	1330 (18.0)	568 (19.6)	762 (17.0)	0.006
Diarrhea	1607 (21.7)	622 (21.4)	985 (22.0)	0.524
Chest pain	2314 (31.3)	1059 (37.2)	1255 (28.5)	< 0.001
Chills	2645 (35.8)	1126 (39.6)	1519 (34.6)	< 0.001
Headache	4816 (65.1)	1968 (67.6)	2848 (63.7)	0.001
Myalgias	4110 (55.6)	1736 (60.7)	2374 (53.8)	< 0.001
Arthralgias	3935 (53.2)	1694 (59.3)	2241 (50.7)	< 0.001
Malaise	4304 (58.2)	1925 (66.9)	2379 (53.8)	< 0.001
Rhinorrhea	1760 (23.8)	677 (23.8)	1083 (24.6)	0.438
Polypnea	1625 (22.0)	908 (32.0)	717 (16.3)	< 0.001
Vomiting	713 (9.6)	298 (10.5)	415 (9.5)	0.146
Abdominal pain	1038 (14.0)	442 (15.6)	596 (13.6)	0.017
Conjunctivitis	672 (9.1)	240 (8.5)	432 (9.9)	0.047
Cyanosis	651 (8.8)	376 (13.3)	275 (6.3)	< 0.001
Sudden onset of symptoms	2706 (36.6)	1050 (36.5)	1656 (37.8)	0.261

chronic kidney disease (p = < 0.001), and smoking (Table 1).

The main symptoms were cough (78.7%), fever (73.7%), headache (65.1%) and malaise (58.2%). The mean time between the start of symptoms and testing (RT-PCR for SARS-CoV-2) was 7.6 ± 6.6 days. The disease was classified as influenza type in 47.3% (n = 3,495) and acute respiratory illness in 47.3% (n = 3,899) (Table 2).

23.6% of patients (n = 1,744) had viral exposure to SARS-CoV-2 (Table 1). This group had less mortality (p = < 0.001). Symptoms like fever, cough, dyspnea, irritability, chest pain, chills, headache, myalgia, arthralgias, malaises, polypnea, abdominal pain, and cyanosis were more frequently found in the non-survivor group. The patients received previous treatment with antipyretics (44.5%, n = 3,292), antibiotics (23.6%, n = 1,746), and

antivirals (14.8%, n = 1,098). Oseltamivir was the most common with 14% (n = 1,038). 59.7% (n = 4,413) of the patients required in-hospital treatment, where 50.4% (n = 3,724) were diagnosed with pneumonia, 8.9% (n = 661) required mechanical ventilation, and 5.3% were admitted to the ICU (Table 2).

The mortality was of 39.5% (n = 2,917). The time from the start of symptoms until death was 12.8 ± 8.4 days and from admission until death was of 8.4 ± 7.7 days (Table 3). The group of non-survivors was diagnosed with serious acute respiratory disorder (77.8% vs. 36.4%, p = < 0.001); ambulatory treatment such as antipyretics, antibiotics, and antiviral use was related to developing pneumonia (78.5% survived, 32.1% did not survive, p = < 0.001). 10.9% of out-patients died compared to 89.1% of in-patients (p = < 0.001). The first group required mechanical ventilation (20.7% vs. 6.8%, p = < 0.001) and was admitted to the ICUs (10.1% vs. 2.2%, p = < 0.001) (Table 3 and Table 4).

Discussion

A total of 7,394 cases of patients over the age of 65 were included in the study. The percentage of patients with a positive PCR test for SARS-CoV-2 was 5.2%, which contrasts with most of the literature published in other countries where the percentage of patients is higher. For example, in China, ranging from 11% to 37% [10,11] and 57% to 60% in studies carried out in Spain and Italy, respectively. However, these studies only included patients who required admission to a hospital, unlike our analysis which included in-patients and out-patients [12,13].

The mortality was found to be 39.5%, a percentage significantly higher than that of other studies, where mortality does not exceed 5% in elderly patients. The percentage of men in the group of non-survivors was higher (64.3%) and the mean age was two years higher than that of the survivors, which coincides with previous literature where it has been proposed that the male sex and older age are risk factors of fatal outcomes [10,14]. Men were also found to be more affected in the non-survivor group (64.3%), and the mean age was two years older than that of survivors.

Significant statistical differences were found between the group of survivors and those who did not survive in relation to comorbidities. The latter was found to

Table 3: Group comparison of disorder classification and ambulatory treatment based on mortality.

	Total	Did Not Survive	Survived	P-value
Started of symptoms until register	7.6 ± 6.6	7.25 ± 5.47	7.95 ± 7.24	< 0.001
Classification disorder				< 0.001
Influeza type disease	3495 (47.3)	649 (22.2)	2846 (63.6)	
Serious Acute Respiratory Infection	3899 (52.7)	2268 (77.8)	1631 (36.4)	
Ambulatory treatment				
Antipiretics	3292 (44.5)	1142 (39.7)	2150 (48.3)	< 0.001
Antibiotics	1746 (23.6)	739 (68.0)	1007 (31.2)	< 0.001
Antiviral	1098 (14.8)	586 (21.7)	512 (11.9)	< 0.001
Type of antiviral				0.004
Aciclovir	2 (0.02)	0	2 (0.2)	
Amantadina	18 (0.2)	5 (0.9)	13 (2.6)	
Lopinavir/Ritonavir	28 (0.4)	7 (1.2)	21 (4.1)	
Oseltamivir	1038 (14.0)	570 (97.4)	468 (92.3)	
Rimantadina	4 (0.1)	2 (0.3)	2 (0.4)	
Zavamivir	2 (0.02)	1 (0.2)	1 (0.2)	

Table 4: Group comparison of outcome by mortality.

	Total	Did not Survive	Survived	P-value
Management				< 0.001
Out-patient	2981 (40.3)	317 (10.9)	2664 (59.5)	
In-patient	4413 (59.7)	2600 (89.1)	1813 (40.5)	
Pneumonia	3724 (50.4)	2289 (78.5)	1435 (32.1)	< 0.001
Mechanical ventilation	661 (8.9)	538 (20.7)	123 (6.8)	< 0.001
Intensive care unit admittance	394 (5.3)	294 (10.1)	100 (2.2)	< 0.001
Mortality	2917 (39.5)			
Time from de symptoms until death	12.8 ± 8.4			
Time from admittance until death	8.4 ± 7.7			

have multiple comorbidities such as diabetes, hypertension chronic kidney disease and smoking. However the difference was not significant regarding obesity, which contrast with studies where it has been presented as a risk factor [10,15].

The most frequent symptoms coincide with those reported in recent literature, predominantly fever, cough, general malaise, headache and dyspnea. However, a significant proportion presented chest pain and diarrhea, which have not been reported as frequently in younger patients [9,16,17].

This data provided an overview of the increase of complications in elderly patients, where more than half required hospitalization and mortality was higher. Nevertheless, the proportion of patients managed with mechanical ventilation was relatively low (8.9%). It was found that various comorbidities are related to fatal outcomes in these patients and that they can present symptoms that are considered rare in younger patients.

Conclusions

COVID-19 affects the elderly population resulting in higher mortality compared to results from other countries. Elderly patients are less frequently intubated and admitted to the ICU. More analysis regarding the context of each health clinic should be conducted to determine risk factors and bioethics issues that would help create health interventions for the future that improve treatment and reduce mortality rates.

Ethics

We follow the Mexican guidelines for clinical research.

Acknowledgement

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