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Epidemiological, Clinical, Paraclinical, and Evolutionary Aspects of COVID-19 Patients Hospitalized in the ETC of the City of Touba (Senegal)

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Abstract: COVID-19 is a global public health threat. The number of confirmed cases is multiplying day by day. This study aims to determine the sociodemographic, clinical, and paraclinical characteristics related to the new coronavirus (COVID-19) of patients hospitalized in Touba ETCs. Methodology: A cross-sectional, descriptive, and analytical study was conducted from May 28, 2020, to July 31, 2021. All COVID-19 patients hospitalized in the ETCs of Touba commune have recovered. Data were collected through a questionnaire with socio-demographic, clinical, and evolving characteristics. The analysis of the data was carried out through the R. Results: A total of 121 individuals were surveyed and 66.48% of them were male. The average age of our patients was 56.38 ±18.6 with extremes ranging from 02 to 87 years. In our study, 96.17% of patients resided in Touba; of 3.83%were travelers. We could notice all the usual signs of covid19 fever 96.7%, cough 91.1%, and headaches 82.7%... Factors associated with death were the occurrence, of respiratory distress 13.1 [2.09-25.5] times the higher risk and the poor saturation (SaO2<90%), 6.89 [1.97-33.4] times more risk. Conclusion: COVID-19 is a public health issue. However, early management of the disease may reduce the risk of death.

Keywords: COVID-19, Epidemiologic, Death

1. Introduction

COVID-19 is a disease caused by the new coronavirus, SARS-Cov-2. It is an emerging respiratory infection first discovered in December 2019, in Wuhan City, Hubei Province, China. It is a zoonosis with human-to-animal transmission [1]. It spread rapidly and widely, from the city of Wuhan to other parts of the world, threatening the lives of many people [2].

At the end of January 2020, the World Health Organization (WHO) declared COVID-19 a Public Health Emergency of International Concern and called for all countries to work together to prevent its rapid spread. More than 118,000 cases in 114 countries and 4291 deaths were registered in march 2020. The most worrying outbreaks were first in France, followed by Spain, Italy, and the United States of America. Faced with this rapid spread, the WHO finally declared the epidemic a pandemic on March 11, 2020 [3]. On 19 April 2020, the World Health Organization (WHO) published 2,242,000 confirmed cases including 72,846 new cases and 15,3,500 deaths. These figures were 14,760 confirmed cases in the WHO AFRO region, including 868 new cases, and 662 deaths, including 34 new cases [4].

Senegal reported its 1st confirmed case on 02 march 2020 and since then the response plan has been reinforced by the conduct of an emergency contingency plan. Nevertheless, the country continued to register cases of COVID-19, on April 20, 2020, 377 including 10 new cases and 5 deaths.

An increase in the number of cases is gradually noted. Twenty-five health districts have recorded cases, including Touba, Senegal's second most populated city behind Dakar, despite the importance granted to communication and community commitment [5].

Face this situation, it was considered necessary to study the sociodemographic, clinical, paraclinical, and evolutionary characteristics as well as the factors associated with the deaths of covid19 patients hospitalized in the ECTs of the city of Touba.

1.1. Study Framework

The city of Touba is located 196 km away from Dakar capital of Senegal (Figure 1) and extends over an area of 553 km^2. The population is estimated at 935446 inhabitants' density is 1691 inhabitants/km².

Resident populations are highly mobile both inside and outside the country. The annual pilgrimages (Magals) and the weekly "ziarras" of the "dahiras" have made the Touba population fluctuate throughout the year. The family is of the extended type with a father most often polygamous and many children. There are also many "daaras" with hundreds of children learning the Quran.

1.2. Health Situation

The city has several infrastructures including a level 3 hospital: UHC Matlaboul Fawzaini and the device in the fight against COVID-19 with two ETCs: the ETC of Fawzaini and Toscana.

In both ETCs, the care of the sick was done by medical staff, hygienists ensured bio-cleaning, police, security, ambulance drivers, transport of patients. Red Cross officers were strengthening the National Hygiene Service.

The Fawzaini ETC located inside Matlaboul Fawzaini Hospital had 25 single beds with oxygen and 7 intensive care beds.

The ETC of Toscana is located southeast of Touba on the road to KHELCOM, a health center built by the nationals of the locality. This center consisted of 5 beds with oxygen and 13 single beds without oxygen and without resuscitation managed by 6 general practitioners and 10 paramedics. Simple and moderate cases including elderly people with comorbidities were managed. Transport of unstable patients to the resuscitation of the Fawzaini ETC and the transmission of control tests to the laboratory.

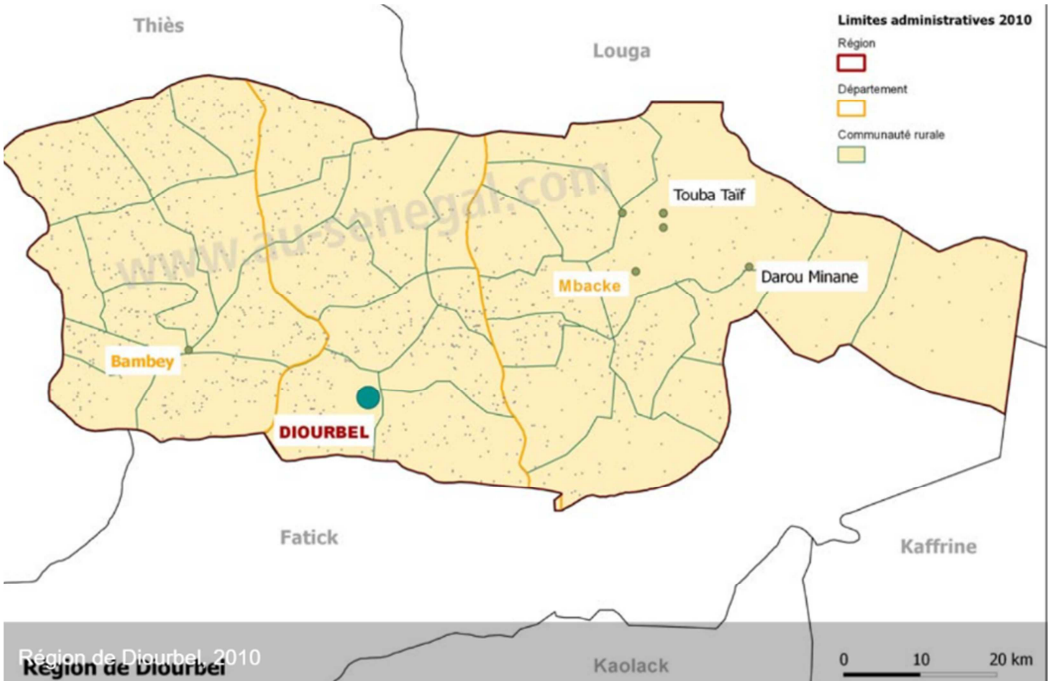

Figure 1. *Administrative division Diourbel Region.*

2. Methodology

2.1. Type and Period of Study

A retrospective, cross-sectional, and analytical study was conducted in the period from 28/05/2020 to 13/08/2021.

2.2. Study Population

This was an investigation into the records of COVID-19 patients hospitalized at the ECT level of the commune of Touba.

Included were the records of patients hospitalized at one of the ETCs of Touba during the period from 28/05/2020 to 31/07/2020.

Not included was any record of patients with COVID-19 hospitalized in the ETC that was not usable (poorly maintained, lost...).

2.3. Sampling

A comprehensive recruitment of records of COVID-19 patients meeting the inclusion criteria was conducted:

2.4. Collection Tool and Technique

A flow was made, and a data survey sheet was prepared to

collect data on socio-demographic, clinical, and paraclinical characteristics, and evolving profiles.

2.5. Data Capture and Analysis

The data was entered into Excel and analyzed on R software. The analysis consists of two parts.

The descriptive part consisted in calculating the average with their standard deviation for quantitative variables and frequencies for qualitative variables.

The analytical part made it possible to cross the variables by the comparison of proportion, it is a bivariate analysis and the Khi2 and Fisher test were used according to their applicability condition the p was significant if it is <0.005. Multivariate analysis was performed using modeling.

A stepwise descent method was used, the adjusted odds Ratio surrounding the confidence interval was calculated.

3. Results

3.1. Descriptive Analysis

Socio-demographic characteristics

Our study included 121 (66.48%) males and 61 (33.52%) females, for a sex ratio of 1.98 in favor of males. The mean age of our patients was 56.38 ±18.6 with extremes ranging from 02 to 87 years. The median age was 60 years. The most represented age group was over 60 with a proportion of 48.9%.

In our study singles were in the majority and represented 85.71% or 156 cases, 96.17% of patients resided in Touba except for 3.83% who were incoming travelers, and 0.55% came from China.

Table 1. *Distribution of patients by area of residence.*

Area of residence	Workforce (n)	Percentage (%)
China	1	0,55
Diourbel	3	1,64
Fouta	2	1,09
Mbacké barry	1	0,55
Touba	176	96,17
TOTAL	183	100,00%

Out of 59 patients listed, traders accounted for 49.15% of cases, followed by housewives with 28.81% (see table 2).

Table 2. *Distribution of patients by occupation.*

Profession	Workforce (n)	Percentage (%)
Health agent	6	10,17
Merchant	29	49,15
Cook	1	1,69
Teach	3	5,08
Macon	1	1,69
Mediator	1	1,69
Housewife	17	28,81
Firefighter	1	1,69
TOTAL	59	100

3.2. Clinical Data

Regarding comorbidities, hypertensive subjects represented almost half with a proportion of 49.2%; 15.5% were diabetic and there were 2 cases of asthma and obesity or a proportion of 1.10% (see table 3).

Table 3. *Distribution of patients by comorbidity.*

Comorbidities	Actual n (%)	Total
HBP		181
NOT	92 (50.8)	
YES	89 (49.2)	
Diabetes:		181
NOT	153 (84.5)	
YES	28 (15.5)	
Asthma:		181
NOT	179 (98.9)	
YES	2 (1.10)	
Obesity:		181
NOT	179 (98.9)	
YES	2 (1.10)	

Other comorbidities were essential, stroke, and HIV with equal proportions (28.7%) of cases (see table 4).

Table 4. *Distribution of patients by other comorbidities.*

Other comorbidities	Workforce (n)	Percentage (%)
Stroke	2	28,57
Sickle-cell anemia	1	14,29
Hepatopathies	1	14,29
IRC	1	14,29
VIH1	2	28,57
TOTAL	7	100

All the usual signs of COVID-19 were present fever (96.7%), cough (91.1%), headache (82.7%), rhinorrhea (43%), breathing difficulties (50.3%), diffuse pain (95.0%) more represented. The other signs were essentially asthenia (78.43%), and lethargy (16.67%) (see Tables 5 and 6). The average saturation was 91.04%±11.1 with extremes ranging from 56% to 99%. 61.7% of patients had good saturation (SaO2>90%) (see Tables 5 and 6).

Table 5. *Distribution of patients by clinical signs.*

Clinical signs	Workforce n (%)	Total
Fever:		181
NOT	6 (3.31)	
YES	175 (96.7)	
Cough:		179
NOT	16 (8.94)	
YES	163 (91.1)	
Sore throat:		177
NOT	176 (99.4)	
YES	1 (0.56)	
Headache:		179
NOT	31 (17.3)	
YES	148 (82.7)	
Rhinorrhea:		179
NOT	102 (57.0)	
YES	77 (43.0)	
Difficulty breathing:		179
NOT	89 (49.7)	
YES	90 (50.3)	
Widespread algia:		179
NOT	9 (5.03)	
YES	170 (95.0)	

Table 6. *Distribution by other signs.*

Other signs	Workforce (n)	Percentage (%)
Ageusia	1	0,98
Anosmia	3	2,94
Asthenia	80	78,43
Chills	1	0,98
Lethargy	17	16,67
TOTAL	102	100

3.3. Biology and Imaging

The results of the biological parameters were not particular. On the other hand, lung damage between 25% and 75%, was noted in patients, the attacks of 50% were greater with 35.29%.

3.4. Multivariate Analysis

The aim was to model death, showing the factors associated with it in a consistent approach. Patients with respiratory distress were 13.1 times more likely to die, and those with poor saturation (SaO2<90%) were 6.89 times more likely to die (see Table 7):

Table 7. *Logistic regression of factors associated with death.*

Characteristics	OR[1]	95% CI[1]	p-value
Difficulty breathing			
NOT	—	—	
YES	13.1	[2,09- 25,5]	0.021
Sore throat			
NOT	—	—	
YES	50	0.00, ON	>0.9
Type of saturation			
Good	—	—	
Bad	6.89	[1,97- 33,4]	0.006

[1]OR = Odds Ratio, CI = Confidence Interval

4. Discussion

This study was conducted in a resource-limited country. The technical platform is inadequate, in particular the absence of a device for the production of blood gases, and the limited number of patients who have been able to carry out the chest radiological assessment. In addition, this was a retrospective study conducted in two treatment centers in the city of Touba, which only involved hospitalized patients. These shortcomings have led us to use the term "acute respiratory distress" rather than "acute respiratory distress syndrome" as described in the literature of developed countries. The burden of the pandemic was less severe in our context than reported in some European or American countries.

Our study included 121 (66.48%) men or a sex ratio of 1.98 in favor of men. The average age of our patients was 56.38 ±18.6 with extremes ranging from 02 to 87 years. These results are applicable to those of Diop [6] who found 53 ± 18 years and a sex ratio of 1.38. This predominance of the male population was reported in patients hospitalized in Algeria [7]. The majority of respondents resided in Touba which is a tourist city where hundreds of pilgrims are welcomed each year. The low attendance found during our study could be related to restrictive measures such as border closures, taken during the pandemic [8].

In terms of comorbidities, hypertensive subjects were more represented with a proportion of 49.2%; 15.5% were diabetic. Diawara [9] in Niger had similar results. It also reported that high blood pressure was the most represented with 24.5% of cases followed, diabetes in 17.9%. Clinical symptoms were similar to those found in the literature [6]. We did not note any biological peculiarities but Kefti [7] found a biological inflammatory syndrome (90.1%), basocyemia (70.8%), lymphopenia (53.3%), increased lactate dehydrogenase (52.2%), anemia (38.7%), increased phosphokinase (28.8%) and hepatic cytolysis (27.6%). The most common CT signs were frosted glass images (91.8%), and alveolar condensations (61.2%).

In this study, almost half of the patients (50.3%) had experienced ARD during hospitalization and 34.6% of them died. Factors associated with ARD and death were mainly advanced age (> 65 years). Indeed, risk factors for developing severe COVID-19 include age ≥ 65 and comorbidities such as hypertension, diabetes, chronic lung disease, chronic kidney disease, immunodeficiencies, chronic liver disease, cancer, cardiovascular disease, and obesity [10]. In our study, cases with ADR had a 13.1 higher risk of death, those that can be correlated with those in Wu, China [11]. Bertoloti [12], in Italy, reported that 19.4% of deaths were due to ARD.

Several studies have shown that older age is associated with an increased risk of developing ARDS and dying from it, probably due to a less rigorous immune response. According to Mezaleck [13], 71% of patients died in an adult acute respiratory distress syndrome (ARDS) picture. Mortality mainly affects middle-aged and elderly patients with pre-existing diseases (cancers, cirrhosis, high blood pressure, coronary artery disease, diabetes mellitus, chronic kidney disease, immunodeficiency, cerebrovascular diseases, and neurodegenerative diseases).

In France, 89% of patients who died were over 65 years of age and 90% of them had a comorbidity including hypertension. The results of the present study suggest that the occurrence of ARD and death is influenced by advanced age (> 60 years). Particular attention should be paid to older adults with COVID-19. In studies by Zhou et al. and Wu et al., hypertension and diabetes were significantly associated with the occurrence of ARDS in multivariate analysis and mortality [14] [15]. In our study, hypertension was independently associated with mortality risk in multivariate analysis. The survival rate of patients with hypertension was 75.3% in hospitalization.

It is also shown that the variation in mortality figures depends on the demographic profile of countries and the response of health authorities to the pandemic in the early stages [16]. It is important to note that countries' early detection policies and technical platforms have significantly influenced reported mortality rates [17].

5. Conclusion

COVID-19 is a zoonotic disease that is a global public health problem. It has several manifestations ranging from mild to severe, such as acute respiratory distress that can lead to mortality. However, the inadequacy of the technical platform, in particular, the absence of devices for the realization of blood gases is an obstacle to the efficient management of patients with breathing difficulties. It is therefore essential to promote the availability of adequate equipment for better management of severe forms of ARD.

Declarations

Conflicts of Interest

The authors declare no conflict of interest.

Data Dissemination

The data collected anonymously during the analysis are kept confidential. Only those responsible for the study had access to the data. The data will also be shared with the scientific community.

Ethical Considerations

The files were operated within the structure. The anonymity of the patients was maintained during the collection and analysis of the data.

Evaluation of Ethical Risks

There was a risk reduction for this study because no administration of drugs, biological fluid samples, or clinical and/or para-clinical examinations was planned.

Abbreviations

ARD: acute respiratory distress, ADRS: acute respiratory distress syndrome, CODIV-19: Coronavirus Disease 2019, ETC: Epidemic Treatment Centre, HBP: High blood pressure, SARS-Cov-2: severe acute respiratory syndrome related to Coronavirus infection, WHO: World Health Organization.

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