Original Research Article

Epidemiological, clinical and radiological profile of patients hospitalized for covid19 at the Epidemic Treatment Centre of the Fann hospital, Dakar during the third and fourth waves

ABSTRACT

Aims: To describe the epidemiological, clinico-biological and radiological aspects of patients hospitalized for COVID19 infection at the Fann Epidemics Treatment Center (ETC).
Methodology: Cross-sectional study in Fann hospital during, between July 2021 and March 2022. We included all patients hospitalized for Covid19 infection on the basis of epidemiological, clinical and CT scanographic evidence associated with a positive RT-PCR or Ag RDT. The data were entered into Excel and analysed using R software. Qualitative variables were expressed as absolute and relative frequencies. Quantitative variables were described by the average accompanied by its standard deviation or the median associated with the extremes according to their distribution.
Results: We enrolled 248 patients during the study period. The average age was 61.7 ±15.2 years. Of the 248 patients, 110 were women (44.4%). High blood pressure was the most frequent comorbidity and was found in 89 patients (35.89%), followed by diabetes (21.7%) and obesity (7.26%) respectively. Three quarters (76.6%) of our patients had not been vaccinated against covid19. Dyspnoea was the most frequently encountered clinical symptoms (77%). More than a third of patients (39%) had extra-respiratory symptoms. A total of 109 patients underwent d-dimer testing, of whom 80 (73.4%) had levels ≥ 500ng/ml. One hundred and eighty-two patients (73.4%) had undergone thoracic CT or CT angio. And among them, 74.4% had ground-glass lesions, and half (50%) had severe to critical lesions. In our study, 52 patients died, representing a case-fatality rate of 21%.
Conclusion: Our study population consisted mainly of elderly subjects, most of whom had not been vaccinated against covid19 and had one or more comorbidities, the most representative of which were high blood pressure, diabetes and heart diseases. In this population, the lethality of covid19 was not negligible, at around one in four patients.

Keywords: COVID19, Profile, Fann

1. INTRODUCTION

Coronaviruses form a family comprising a large number of viruses that can cause a wide range of diseases in humans, from the common cold to severe acute respiratory distress syndrome **[1]**. COVID19 (Coronavirus Infectious Disease 2019) is an emerging contagious zoonotic disease caused by the severe acute respiratory syndrome 2 (SARS-CoV-2) virus. The pandemic started in Wuhan, China and was first reported to the World Health Organization (WHO) in December 2019 **[2]**. It was declared a public health emergency of international concern (PHEIC) on 30 January 2020, and a pandemic on 11 March 2020 **[1]**. Existing data imply that COVID-19 is easily transmitted by person-to-person contact, probably via respiratory droplets, and can be transmitted by infected people who have no or mild symptoms, leading to its rapid spread. Based on initial data, 15% of infected people develop a severe form of the disease, with a case-fatality rate of around 3%, but higher in the elderly and those with co-morbidities, especially cardiovascular and metabolic **[3]**. As of 20 July 2021, 191,968,747 positive cases had been reported and 4,121,955 deaths notified, with very significant socio-economic repercussions **[4]**. In the face of rampant globalisation, Africa, and Senegal in particular, have not escaped this devastating pandemic. Even though Africa appears to be less affected, with 6,267,776 positive cases, or 3.26% of cases worldwide, and 158,697 deaths recorded as of 20 July 2021 **[4]**. In Senegal, since the first case was recorded on 2 March 2020, the monthly number of positive cases and deaths linked to COVID-19 has been rising steadily **[5]**. The geographical distribution is uneven across the country. As of 20 July 2021, the Dakar region was the epicenter of the pandemic, accounting for more than 67.72% of national cases. It is followed by the regions of Thiés and Diourbel, which accounted for 10.79% and 3.84% of national cases respectively **[6]**. It is in this context that we conducted this study, the aim of which was to describe the epidemiological, clinico-biological and radiological aspects of patients hospitalised for COVID 19 infection at the Fann ETC (Epidemics Treatment Centre).

2. METHODOLOGY

2.1. TYPE AND PERIOD OF STUDY

This was a retrospective, cross-sectional, descriptive study conducted over a period of 09 months from 01July 2021 to 31 March 2022.

2.2. STUDY POPULATION

Our work focused on all patients with COVID19 hospitalized at the Epidemics Treatment Centre of Fann hospital during the 3rd and 4th waves. We performed an exhaustive sampling and included all patients hospitalized for Covid19 infection on the basis of epidemiological, clinical and CT scanographic evidence associated with a positive RT-PCR or Ag RDT.

2.3. DEFINITION OF VARIABLES

- Hyperleukocytosis was defined as a white blood cell count higher than or equal to 12,000 cells/mm3.
- Thrombocytopenia was defined as a platelet rate of less than 150,000 cells/mm3.
- Elevated C-reactive protein was defined as a level higher than or equal to 6mg/l
- And for PCT (procalcitonin) a level higher than 0.5ng/ml.
- D-dimer levels were considered elevated when they were higher than 500ng/ml.
- Creatinine was considered elevated when its level was higher than 13mg/l.

- The extent of CT lesions was assessed according to the definition of the French Society of Radiology, with several stages including minimal (<10%), moderate (10-25%), significant (26-50%), severe (51-75%) and critical (>75%).

2.4. DATA COLLECTION

Data were collected from patients' medical records and laboratory data using a Microsoft Excel Workbook (.xlsx) input mask. The following parameters were collected epidemiological characteristics (age, sex, occupation, address, marital status, comorbidities, anti-covid19 vaccination status, type of vaccine) clinical characteristics (time between anti-covid19 vaccination and onset of infection, respiratory symptoms, extra-respiratory symptoms (neurological, musculoskeletal, digestive, cardiovascular, uronephrological), paraclinical characteristics (blood count, C-reactive protein, procalcitonin, transaminases, creatininemia, D-dimer and thoracic CT or CT angio) therapeutic characteristics (treatment received before admission to the ETC (Epidemics Treatment Centre), treatment received during hospitalisation at the ETC) evolutionary characteristics (time of hospitalisation, number of patients who died, recovered or were transferred).

2.5. DATA ENTRY AND ANALYSIS

The data were entered into Excel and analysed using version 4.1.0 of the R software. Qualitative variables were expressed as absolute and relative frequencies. Quantitative variables were described by the average accompanied by its standard deviation or the median associated with the extremes according to their distribution.

3. RESULTS

3.1. EPIDEMIOLOGICAL ASPECTS

We enrolled 248 patients during the study period. The average age was 61.7 ±15.2 years and the most representative age group was 60 years and over. Of the 248 patients, 110 were women (44.4%), with a sex ratio (M/F) of 1.25. Over a third of our patients (36.7%) had no occupation. One hundred and forty-two patients (78%) were married. More than half of our patients (57.5%) lived in Dakar. High blood pressure was the most frequent comorbidity and was found in 89 patients (35.89%), followed by diabetes (21.7%) and obesity (7.26%) respectively. Three quarters (76.6%) of our patients had not been vaccinated against covid19. Those vaccinated were mainly Sinopharm (34%), Astrazeneca (28%), Johnson and Johnson and Pfizer. Two hundred and fifteen (86.7%) of the patients had been hospitalized in another facility prior to their admission to the Fann ETC **(Table I)**.

Table I: *Distribution of patients according to epidemiological characteristics (ETC of Fann, July 2021-March 2022), N=248*

Characteristics Sociodemographic	Absolute frequency (n)	Relative frequency (%)
Sex		
Men	138	*55.6*
Women	110	*44.4*

Age		
< 20 ans	02	*1.2*
[20-40 ans [	19	*7.7*
[40-60 ans [	84	*33.9*
≥ 60 ans	143	*57.3*
Covid19 Vaccination		
Yes	58	*23.4*
No	190	*76.6*
Type of Covid19 vaccine received		
Sinopharm	20	*34.0*
Astrazeneca	16	*28.0*
Johnson-Johnson	07	*12.0*
Pfizer	01	*2.0*
Not specified	14	*24.0*
Comorbidities		
HTA	89	*35.9*
Diabete	55	*22.2*
Obesity	18	*7.2*
Cardiopathy	15	*6.0*
Smoking	11	*4.4*
CVA	7	*2.8*
Tuberculosis	6	*2.4*
Dyslipidemia	5	*2.0*
COPD	2	*0.8*
HIV Infection	1	*0.4*
Dysthyroidism	1	*0.4*
Chronic kidney disease	1	*0.4*
Solid tumors	1	*0.4*
Ethylism	3	*0.1*

3.2. CLINICAL ASPECTS

Dyspnoea was the most frequently encountered clinical symptoms (77% of patients), followed by cough and chest pain (58.5% and 24.6% respectively). More than a third of patients (39%) had extra-respiratory symptoms **(Figure 1)**. For vaccinated patients, the average time to onset of covid-19 after vaccination was 5.09 ± 4.63 weeks [1-13 weeks].

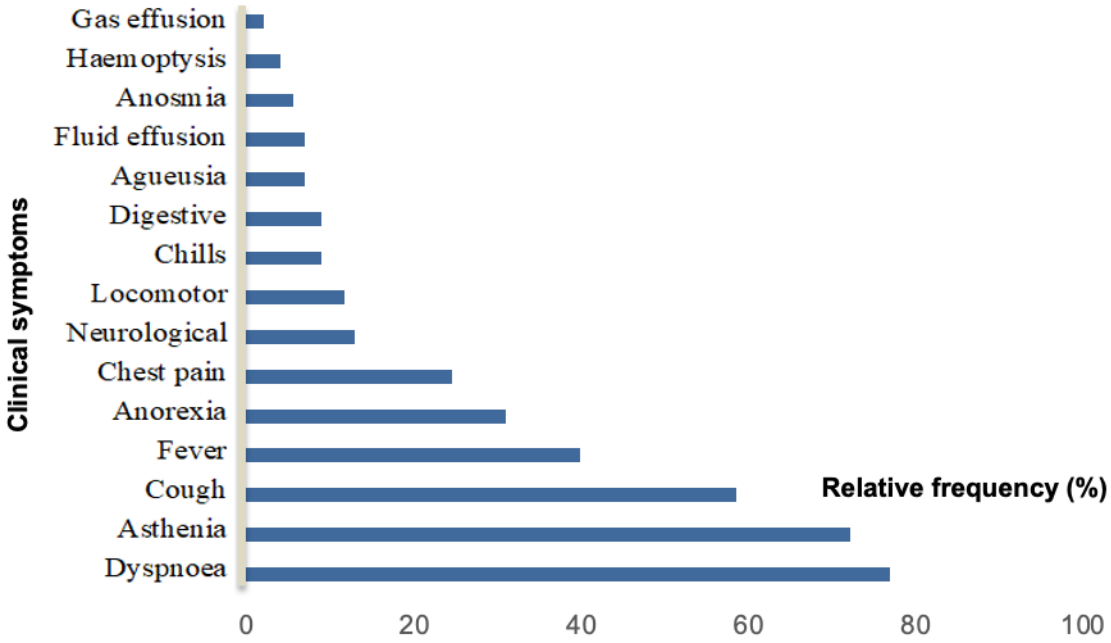

Figure 1: Distribution of patients by clinical symptoms, ETC of Fann (july 2021-march 2022, N=248)

3.3. PARACLINICAL ASPECTS

Sixty-two patients (44%) had hyperleukocytosis on blood count. One hundred and thirty-three patients (133/144) or 92.4% had a C-reactive protein ≥ 6 mg/l. Of 87 patients who had a procalcitonin assay, 30 (34.9%) had an elevated level. Thirty patients (14.1%) had hepatic cytolysis, and 25 had creatinine levels ≥ 13mg/l. A total of 109 patients underwent d-dimer testing, of whom 80 (73.4%) had levels ≥ 500ng/ml. One hundred and eighty-two patients (73.4%) had undergone thoracic CT or CT angio. And among them, 71.9% had ground-glass lesions, and half (50%) had severe to critical lesions **(Table II)**.

Table II: *Distribution of patients according to type and extent of lesions on thoracic CT (ETC of Fann, July 2021-March 2022)*

	Absolute frequency (n)	**Relative frequency (%)**
Type of lesions on chest CT (N=182)		
Ground-glass	131	*72.0*
Infiltrates	7	*3.9*
Pleuresis	4	*2.2*
Condensations	4	*2.2*

Fibrosis	3	*1.7*
Not specified	27	*14.9*
Normal	06	3.3
Extent of CT lesions (N=176)		
Critical	38	*21.6*
Severe	50	*28.4*
Important	11	*6.3*
Moderate	38	*21.6*
Minimal	23	*13*
Not specified	16	*9.1*

3.4. THERAPEUTIC ASPECTS

Almost all our patients (97.8%) had received preventive or curative anticoagulation combined with corticosteroid therapy (93.6%). In addition, 223 patients (89.9%) had been treated with non-specific antibiotics, mainly third-generation cephalosporins and macrolides.

3.5. EVOLUTIONARY ASPECTS

The average duration of hospitalisation was 7.49 ±6.04 days [0-38 days]. In our study, 52 patients died, representing a case-fatality rate of 21%. A further 33 patients (13.3%) were transferred to intensive care.

3.6. DISCUSSION

Covid19 infection is a truly global public health problem, with many mysteries still to be unravelled. The aim of this study is to describe the profile of patients hospitalised for covid19 at the CHNU Fann epidemic treatment centre, during the 3rd and 4th waves in Senegal.

The average age of our patients was 61.7 ±15.2 years, and the most representative age group was 60 years and over. These data are similar to those found elsewhere, particularly in Italy **[7]**, Algeria **[8]** and China **[9]**, where the average age was similar to ours (over 50 years). On the other hand, Mwana et al **[10]** in Congo and Haidara et al **[11]** in Mali found a younger average age of 46 and 47 respectively. This could be due to the fact that, although the African population is relatively young, covid19 infection mainly affects older people. Indeed, due to the senescence of the immune system, the latter present a greater susceptibility to infections, in this case covid19, compared with young adults. In line with the literature **[12, 13, 14, 8, 15]**, high blood pressure was the most common comorbidity (35.9%), followed by diabetes (22.2%) and obesity (7.26%) respectively. These data corroborate national data **[16, 17, 18]**. This could be explained by the fact that patients

with one or more co-morbidities are more likely to develop symptomatic or even severe forms of covid19, especially if they are not well controlled, hence their hospitalisation.
Also, in relation to vaccination, 76.6% of our patients had not been vaccinated against covid19. Although vaccination is supposed to protect against symptomatic or even severe forms of the disease, data in the literature **[19, 20, 21]** show a decrease in the efficacy of covid19 vaccines in elderly patients and those with one or more comorbidities and/or infection with alpha and delta variants, the main explanatory factor being a decrease in the level of neutralising antibodies in these patients.
Our study population had almost all these factors, i.e. advanced age and one or more comorbidities in more than a quarter of them. In addition, our study period corresponded to the 3rd and 4th waves in Senegal, during which the main circulating variants were alpha and delta.
Clinically, respiratory symptoms were at the forefront of the clinical picture. These results are similar to those found in the literature **[8, 9, 10, 11, 12, 13, 14, 22, 23]** and once again demonstrate the respiratory tropism of SARScov2. In addition, more than a third of our patients (39%) had extra-pulmonary symptoms such as encephalitis, diarrhoea and impaired kidney function. This systemic nature of covid19 infection has also been found in other studies, particularly those by **Ravindra et al [24], B.Long et al [25], Zhou et al [22] and Klok et al [26]**. This is easily explained by the pathophysiology of SARScov2 infection with viral invasion via host ACE2 receptors. Several cells such as the small intestine, thyroid, testicles, adipose tissue, bladder and vascular endothelium express these ACE2 receptors. This sustains widespread pulmonary inflammation and multiple organ damage. This could also explain the positivity or even increase in D-dimer levels during Sarscov2 infection. In fact, of the 109 patients who underwent D-dimer testing, 80 (73.4%) had elevated D-dimer levels. The same results have been found elsewhere **[22, 27, 28]**.
The predominance of lesions with a ground-glass appearance (71.9%) found in our cohort is in line with the data in the literature **[22, 28]**.
In almost half the cases (48.3%), the lesions were severe to critical. The severity of the scanographic lesions could be linked to the advanced age of our patients and the presence of comorbidities that weaken the immune system. Similarly, the delay in consultation and the absence of vaccination against covid19 (76% of our patients) could also explain the occurrence of these severe forms. Similar results have been found in the literature, particularly by **Diop et al [29], Kalidou et al [18] and Kaeuffer et al [30]**.
Nearly 90% of our patients were treated with non-specific antibiotics, mainly third-generation cephalosporins and macrolides. This could be explained by the frequency of bacterial superinfections in severe forms of covid19, making it necessary to start broad-spectrum probabilistic treatment in order to target as many pathogens as possible while awaiting the results of confirmatory paraclinical tests, and to limit the number of deaths.
The case fatality rate in our series was 21%, which is similar to that found in Korea **[31]** and Tunisia **[32]**. This could be linked to the advanced age of our patients, but also to the presence of comorbidities such as high blood pressure, diabetes, obesity and heart diseases. On the other hand, **Diop et al [29] and Kalidou et al [18]**, in studies conducted in Dakar and Ziguinchor respectively, found a lower-case fatality rate (4.2 to 7.7%). This difference could be due to the fact that the Fann ETC is one of the reference facilities for the management of covid19 cases in Senegal, and consequently most of the country's severe cases are admitted there, thus explaining this non-negligible case-fatality rate compared with other ETCs.

4. CONCLUSION

Our study population consisted mainly of elderly subjects, most of whom had not been vaccinated against covid19 and had one or more comorbidities, the most representative of which were high

blood pressure, diabetes, and heart diseases. In this population, the lethality of covid19 was not negligible, at around one in four patients.

CONSENT

The anonymity of the information collected was assured during collecting data.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the authors.

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